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ABSTRACT

Seven chapters present a variety of viewpoints on human feelings, or affect. All, however, are directed at instructional technologists who are involved in the design of instructional systems and all share a concern for the development of instruction which interests, involves, and motivates learners; the papers were chosen on the basis of the facts that their major themes were diverse, well documented by prior research and had clear implications for instruction. The individual essays deal with the following topics: 1) human relations training and the innovation consultant; 2) the role of educational technology in the development of achievement motivation; 3) the effects of anxiety upon computer-assisted instruction; 4) some implications for change regarding education and the major value orientations in our culture; 5) the implications of social learning theory for the design of instructional systems; 6) the techniques and problems of attitude measurement; and 7) the affective relevance of learning games and simulation. (LB)

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CONTRIBUTIONS OF BEHAVIORAL SCIENCE TO INSTRUCTIONAL TECHNOLOGY

1

A RESOURCE BOOK FOR MEDIA SPECIALISTS

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THE AFFECTIVE DOMAIN

A CSC Mediabook

The National Special Media Institutes is a consortium of Michigan State University, University of Southern California, United States International University and Syracuse University.

Contributions of Behavioral Science to Instructional Technology

As a consortium of higher education institutions the National Special Media Institutes (NSMI) represents a joint effort to work on projects of national interest which are significant to the development of the field of instructional technology. A series of seminars sponsored by the U.S. Office of Education and coordinated by the Teaching Research Division of the Oregon State System of Higher Education probed the relationship between the behavioral sciences and the field of instructional technology.

The first seminar was devoted to the cognitive area, the second to the affective area and the third to the psychomotor area. Because of keen interest in the affective area the results of that seminar were published first. The third volume in this series on the psychomotor area will appear shortly after this volume. These three volumes represent new substantive inputs to the field of instructional technology. As the field grew out of its traditional audiovisual product orientation, new insights were required to emphasize the process approach. The behavioral sciences seemed to have more to contribute in this vein than any other substantive field.

The credit for these volumes and the work of the National Special Media Institutes should be given to the late Dr. James D. Finn of the University of Southern California who originally conceived the consortium and stressed the need for new inputs to the growing field of instructional technology.

The papers included in this publication were written pursuant to a grant from the Bureau of Educational Personnel Development, Office of Education, U.S. Department of Health, Education and Welfare.

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CONTRIBUTIONS OF BEHAVIORAL SCIENCE TO INSTRUCTIONAL TECHNOLOGY 1

The Affective Domain

—A Resource Book for Media Specialists

Published for the National Special Media Institutes

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WASHINGTON, D.C.
1972

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Preface

The National Special Media Institutes is a consortium of higher education institutions: The Instructional Media Center, Michigan State University; United States International University in San Diego; the Center for Instructional Communications, Syracuse University; and the Department of Instructional Technology, the University of Southern California. These organizations have joined together to work cooperatively on projects of national interest which are significant to the development of the field of instructional technology.

A series of seminars sponsored by the U.S. Office of Education and coordinated by the National Special Media Institutes through Teaching Research, probed the relationship between the behavioral sciences and the field of instructional technology. The first seminar was devoted to the cognitive area, the second to the affective area, and the third to the psychomotor area. This volume and the two which follow represent new substantive inputs to the field of instructional technology. As the field grew out of its traditional audiovisual product orientation, new insights were required to emphasize the process approach. The behavioral sciences seemed to have more to contribute in this vein than any other substantive field.

The keen interest in the affective area in education caused this volume to be published first. It is more than the proceedings of a conference. It is a carefully edited volume for which original papers were prepared. These papers were revised on the basis of discussions held at the seminar between behavioral scientists and instructional technologists who interacted freely and openly. The papers were then subjected to a final review by Dr. Jack Crawford and Dr. Floyd Urbach of the Teaching Research Division.

The credit for this volume and the work of the National Special Media Institutes should be given to the late Dr. James D. Finn of the University of Southern California who originally conceived the consortium and stressed the need for new inputs to the growing field of instructional technology. The genius of Jack Edling and his staff at Teaching Research made the seminars possible in an attractive Oregon locale. Such environmental stimuli added to the quality of the discussions.

Syracuse, New York
June 1970

Donald P. Ely

Introduction

Jack Crawford

The seven chapters of this volume present at least seven diverse viewpoints written by seven different sets of authors. Both the chapters and authors possess one common attribute: A concern with developing instruction which interests, involves, and motivates learners. Seven facets of human feelings, or affect, are presented by authors who have been engaged in the basic research and instructional applications of that particular approach.

The book is intended primarily for the instructional technologist who is involved in designing, developing, or revising instructional systems. However, the chapters are useful to anyone concerned with the improvement of instruction. The reader will find that each chapter loosely fits a three-stage pattern:

- The approach and its background
- Examples of the research and developmental studies
- Implications for instruction.

The reader should be alerted that the seven approaches selected do not blanket the field of affect. Nor does the volume present an overview or an encompassing theory of the entire field. It contains seven independent and prominent developments stemming from the behavioral sciences. Criteria for selection were:

- The approaches should differ markedly from one another and be representative of a wide range of research and development pursuits.
- Each approach should be supported by at least a moderate amount of prior research and development exploration.

- Implications for instruction should be clearly identified.
- The authors were available and willing.

The present chapters are the outcome of the authors' original genius as influenced by exchanges with the seminar staff of Teaching Research and tempered in a trial by fire and fluids. The latter consisted of a four-day symposium, on the Oregon Coast, at which each author presented his chapter and was then honored with constructive assistance from each of the other authors, members of our own staff, and representatives of the primary target group—the instructional technologists. Thus glutted with useful suggestions, the authors retired homeward and revised their chapters.

In the first chapter, Bill Barber discusses Human Relations Training. His concept of Human Relations Training encompasses the activities of T-Groups, sensitivity training and encounter groups—activities recently marked by flourishing applications throughout education and management training. Bill holds the equivalent of the Black Belt in group processes, and is actively engaged in organizational and institutional applications of this approach.

Achievement Motivation, the second chapter, is authored by David McClelland, who writes from a background of more than twenty years of directing the leading research programs in this area.

Charles Spielberger copes with Anxiety in the third chapter. New theoretical constructs and a resultant series of research studies exploring the relationships between anxiety and learning represent part of Charles Spielberger's professional contributions which are reflected in this chapter.

O. J. Harvey summarizes his study of four types of belief systems, or major value orientations typical of our culture. Their interactions with curriculum, teacher, student, parent and child are carefully educed from the original research of Harvey and his colleagues.

Fred McDonald and Catherine Kielsmeier integrate a presentation of Social Learning, or Modeling, as a theory of human learning with a clear and cogent summary of its applications to instruction and teacher training. Fred McDonald's own studies constitute a major portion of both the basic research and applied studies in this area.

Allen Edwards and Betty Porter present a readable account, and one particularly useful to the instructional technologist, of the problems and techniques of attitude measurement. A series of original contributions to attitude scales and scaling techniques distinguish Allen Edwards' professional productivity.

In the seventh and final chapter, Paul Twelker and Jack Crawford attempt to summarize developments in the field of Simulation and

Learning Games relevant to affect. Paul has published extensively in both the research and instructional aspects of simulation. Crawford has played a variety of games for many years.

Staff members of Teaching Research have participated in the production of this volume in various ways. Special mention needs to be made, however, of Cathy Keilsmeier who contributed final editorial assistance to several chapters.

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Human Relations Training and the Innovation Consultant

William H. Barber
Western Behavioral Sciences Institute
La Jolla, California

> *If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow.*
>
> *Rachel Carson* – The Sense of Wonder

The third session opened with comments by a few members who noted that they felt clearer about the purpose of the T-Group. They had just listened to a theory session concerned with emotional patterns and group behavior, and they now felt that the task was to bring out on the table and discuss some of the emotional feelings of various group members so that the group could better understand its problems.

From the beginning, Don, an intense, eager, apparently anxious member, had rushed in with suggestions for group action. He had been the first to move on the opening day with a suggestion leading toward introductions. However, as the sessions continued, his interventions had decreased, in relevancy to what was happening in the group. Most of his contributions were lengthy, and all of them dealt with some topic that was far from the group and usually rooted in some personal situation he faced in his work backhome. His interventions came at times when the group was moving toward a decision—usually toward a decision to discuss behavior within the group. One member of the group asked Don directly why he always brought up something of his own just when the group was

beginning to discuss a group problem. Don hotly denied that he had deliberately done so. He said he had been sitting there, thinking both about the group and his own problems, and it seemed to him the questions he had in his own situation were ones that would interest and help the group. After all, he added, his company was sending him here to get something out of the program.

At this point, another member asked, "If you spend all the time bringing your problem in how will the rest of us get any help on ours?It seems to me that we will get the most help as we figure out what we are doing here and how we can improve the situation."

A third member rushed in, however, to defend Don. "Everybody," he said, "must have the right to speak. If Don has something to say to the group, no matter what it is, we should all listen to it. I, for one, think that Don's problems are very serious problems, and I would like to hear him talk about them at greater length."

Don took this as sanction to continue describing a particular back-home situation. His description continued for nearly five minutes. Attention in the group continued to fade, and restlessness became apparent.

After Don had finished his statement, one trainer commented on the growing lack of attention when individual back-home problems were discussed, as compared with the greater attention when present group problems were being discussed. At the same time, he added, a number of group members specifically stated that they did not wish to work on present group problems. The trainer indicated that this seemed to present a dilemma to the group. (Bradford, Gibb, & Benne, 1964, pp. 144-145.)

This episode illustrates a number of the features of the experience-based learning innovation called the T-Group. The T-Group, along with other elements such as lectures and skill exercises, forms the basis for "human relations training."

This paper is an effort to (1) summarize briefly the state of the art and science of human relations training, and (2) illustrate how the applied behavioral sciences can help understand the role of media specialist as an innovation consultant.

Human Relations Training

There are a number of characteristics that distinguish human relations training from other parts of the human potential movement and from

other forms of experience-based education. Among them are (1) the learning goals, (2) the desired outcomes and (3) the assumptions about the learning process that are associated with human relations training.

Goals

At one level of abstraction there are a number of very general goals. These result from the scientific and philosophical values underlying the method. Schein and Bennis (1965) describe five such metagoals: (1) an expanded interpersonal awareness and recognition of choice points. Choice points are the irregular, critical points in a person's life where normal expectations are violated. These are the "forks in the road" where choices are made—consciously or unconsciously; (2) a spirit of inquiry or a willingness to try out new behavior; (3) an increased authenticity in interpersonal relations; being able to accept the experience of being oneself. As one becomes more able to accept and respond to his own experience he becomes less inclined to respond primarily to others' expectations; (4) an ability to act in collaborative and interdependent ways rather than in authoritarian and hierarchical ways; and (5) an ability to resolve conflict through open and creative problem solving instead of through power strategies such as coercion, manipulation or horse trading.

Underlying these metagoals is the implicit notion that openness is desirable in interpersonal relationships. By openness is meant behaviors by person A that communicate to person B the present interior experiences of person A. The interior experiences that are relevant are usually his feelings, wishes and perceptions about the activity in which they are both presently involved. Openness is sometimes confused with self-disclosure or "personalness"; the latter denotes sharing past events or past interior states. Since openness relates the phenomena experience, and shared at the present time, being "open" is likely to result in more growth-producing relationships than is being "personal." This is because in an open relationship each person has maximum information about himself as well as about the other, and therefore maximum alternatives and freedom for choice.

Metagoals such as these underlie the format of a human relations laboratory. They guide staff decisions and shape stated goals such as those that follow. These are described in the literature and are likely to be communicated to participants beginning a laboratory:

1. *Self-insight.* Human relations training aims to bring about greater awareness of one's self and one's own behavior in a social context. By exploring the feelings and perceptions of others about one's behavior in an atmosphere of trust, one can learn to understand why he acts in

certain ways in certain situations. Increased self-awareness is seen as resulting in less defensiveness and more openness and authenticity.

2. *Sensitivity.* Increased sensitivity to behavioral cues (gestures, body position, voice, etc., as well as verbal stimuli) and increased accuracy at inferring emotions underlying these cues, are seen as major goals. Increased empathy, responsiveness, and spontaneity are seen as resulting from greater sensitivity.

3. *Group process knowledge.* What are the types of events that facilitate or inhibit group functioning? What unstated rules governing behavior exist and how do such rules develop? What kinds of behavior cause changes in morale, activity level, and group productivity? Systematic ways of learning about such variables are frequently viewed as appropriate goals.

4. *Diagnostic skills.* Achieving the first three objectives provides the basis for diagnostic ability, i.e., the ability to use relevant explanatory categories for organizing appropriate data about the social behavior of self, others and the "organization."

5. *Action skills.* The goal of increasing action skills is at the interpersonal rather than the technical level, i.e., the ability to intervene in social situations in order to facilitate behavior that increases member satisfactions or productivity.

6. *Learning how to learn*—the ability to continually monitor and modify one's behavior. It refers to one's psychological stance toward himself in social interaction; an attitude toward self and others that is manifested in a high commitment to becoming part of an open, self-renewing interpersonal system.

Range of human relations activities

Because of differing emphasis and priorities among these objectives, one finds a great range of learning experiences under the rubric of human relations training. Figure 1 describes the continuum. At one end of the personal growth goals of self-awareness and sensitivity are emphasized; at the other more organizational goals such as cognitive understanding and specific skills in influencing group and inter-group phenomena are stressed.

Other dimensions may be noted. Depending on one's theoretical point of view, one might also describe the personal growth activities listed as more "person-oriented" versus "organization-oriented"; or as more "emergent" as opposed to more "planned"; or as more "facilitating" rather than "intervening." Decisions about which treatment methods are most useful should depend on careful diagnosis of client needs and on one's assumptions about how learning and growth take place.

CATEGORIZATION OF HUMAN RELATIONS TRAINING TREATMENTS (Gibb, in press)

Treatment Designation	Central Aims	Definitive Activities or Characteristics	Modal Description
Creativity–growth	Creativity, Awareness, Releasing human potential	Induced experiences designed to expand awareness	Otto & Mann (1968)
Marathon	Personal growth, Greater intimacy	Uninterrupted interpersonal intimacy	Stoller (1968)
Emergent	Personal growth	Absence of leader; Non-programmed, unpredictable, emergent activities	Gibb & Gibb (1968b)
Authenticity	Openness, Authentic encounter	Interventions and experiences focused on openness	Bugental (1965)
Sensitivity	Personal competence, Group effectiveness, Organizational effectiveness	Focus on here and now experiences, and on group processes	Bradford, Gibb & Benne (1964)
Programmed	Personal growth, and/or competence, Group effectiveness, Organizational effectiveness	Experiences initiated and/or directed by absent leaders	Berzon & Solomon (1966)
Micro-experience	Interpersonal skills, Group effectiveness, Organizational effectiveness	Limited time (2 to 20 hours; 1 to 2½ days)	Bradford, Gibb & Lippitt (1956)
Inquiry	Skills of inquiry, Group effectiveness, System effectiveness	Data-gathering, quasi-structured experiences, Focus on explicit and predictable individual and group learnings	Miles (1965)
Imbedded	Team effectiveness, Organizational effectiveness	Training experience imbedded in sequential and continuous organization-based program of inputs, data-gathering, and experiences	Argyris (1962) Friedlander (1968)
Discussion	Knowledge, insight; Improved interpersonal relations	Some blending of group discussion, case method, demonstrations, and theory inputs	Hacon (1961)
Instructional	Knowledge, insight; Improved interpersonal relations	Instructions by lectures, demonstrations, discussions, and readings	Jacob (1971)

Figure 1

Learning outcomes

Outcomes of human relations training can be classified in terms of potential individual, group, and organizational learning and provide a second means of distinguishing human relations training from other modes of experience-based learning.

1. *Individual learning.* Most participants in human relations training gain a picture of the impact that they make on other group members. A participant can assess the degree to which that impact corresponds with or deviates from his conscious intentions. He can also get a picture of the range of perceptions accompanying any given act. It is as important to understand that different people may see the same piece of behavior differently—for example, as supportive or antagonistic, relevent or irrelevant, clear or ambiguous—as it is to understand the impact of any given individual. Rarely do all members of a group have even the same general perceptions of a given individual or a specific event.

Some people report that they try out new behavior that they have never tried before. This experimentation can enlarge their view of their own potential and competence and provide the basis for continuing experimentation.

2. *Group learning.* One learns about the forces which affect the group such as the results of different methods of making decisions, the norms controlling the amount of conflict and disagreement that is permitted, and the kinds of data that are gathered, e.g., early in the life of a group, cognitive data tends to be gathered more frequently than affective data; as the group develops, a higher proportion of affective data is gathered. Concepts such as cohesion, power, group maturity, climate, and structure can be examined using the experiences in the group to better understand how these same forces operate in the back-home situation.

3. *Organizational learning.* Status, influence, division of labor, and styles of managing conflict are among organizational concepts that may be highlighted by analyzing the events in the small group. Subgroups that form can be viewed as analogous to units within an organization. It is then possible to look at the relationships between groups, examining such factors as effectiveness of communications, stereotyping, and competitiveness versus collaboration.

A participant is able to examine the kinds of assumptions and values which underlie different leadership styles. The opportunity to link up a philosophy of leadership with specific behaviors that are congruent with or antithetical to that philosophy makes human relations training particularly relevant to understanding the organization (Seashore, 1968).

Underlying assumptions about learning

The following assumptions about the nature of the learning process distinguish human relations training from more traditional models of education:

1. *Learning responsibility.* Each participant is responsible for his own learning. What a person learns depends upon his own style, readiness, and the relationships he develops with other members of the group.

2. *Staff role.* The staff person's role is to facilitate the examination and understanding of the experiences in the group. He helps participants to focus on the way the group is working, the style of an individual's participation, or the issues that are facing the group.

3. *Experience and conceptualization.* Most learning is a combination of experience and conceptualization. A major aim is to provide a setting in which individuals are encouraged to examine their experiences together in enough detail so that valid generalizations can be drawn.

4. *Authentic relationships and learning.* A person is most free to learn when he establishes authentic relationships. When such relationships are established one is able to increase his sense of self-esteem and decrease his defensiveness. In authentic relationships one can be open, honest, and direct with another so that he is communicating actual feelings rather than masked feelings.

5. *Skill acquisition and values.* The development of new skills in working with people is maximized as a person examines basic values underlying his behavior, as he acquires appropriate concepts and theory, and as he is able to practice new behavior and obtain feedback on the degree to which his behavior produces the intended impact (Seashore, ibid.).

Research Evidence

The research evidence on the effectiveness of human relations training is ambiguous. This state of affairs, along with the fact that attitudes of social scientists toward human relations training tend to be bi-polar and strong, results in contradictory interpretations of the evidence that does exist. Consequently, in evaluating research reviews, practitioners find the evidence supports the hypothesis that training leads to behavior change. Non-practitioners review the same literature and find it indicates little or no change as a result of training.

The ambiguity surrounding the research evidence seems due primarily to research design difficulties. Illustrative of the most formidable are:

1. Desired outcomes are broad and frequently abstract changes in

intrapersonal and interpersonal behavior, including inter-related combinations of values; knowledges, attitudes, motivations, perceptions and specific behavioral skills. The goal of "increased sensitivity," for example, involves all of the above elements. A research design and learning theory that specifies the relation between such outcomes and appropriate learning experiences is yet to be developed.

2. If changes do occur the problem of observing and measuring remains. Although a number of sub-problems exist, there are two major issues: first, one needs to specify changes occurring from beginning to end of training; second, one needs to describe how such changes transfer and are manifested in the back-home setting. Does one really learn to express his feelings more accurately and is he able to do so on the job? Or, as some critics suggest, has he simply learned to apply a new set of verbal symbols to the same experience? Both kinds of questions need specification in terms of cognitive and affective outcomes along with more precise and imaginative approaches to observation and measurement.

3. As in research in other areas such as psychotherapy, the provision for adequate control groups is a continuing difficulty. Briefly, the issue is that if a subject is in a control group it may bias his and others' perceptions of him; if a subject has been through training it may give him and others a "set" to expect changes.

These three problems illustrate typical difficulties encountered in attempting to rigorously assess the effects of human relations training. Despite this confusion, however, it seems the following conclusions can be drawn about the effects of human relations training:

1. Many individuals report extremely significant changes and impact on their lives as workers, family members, and citizens. This kind of anecdotal report should be viewed cautiously in terms of application to job settings, but it is consistent enough that it is clear that human relations training experiences can have a powerful and positive impact on individuals. Roughly two-thirds of the participants are seen by themselves or others as increasing interpersonal skills after attendance at laboratories. This figure represents an average across a number of studies.

2. People who attend sensitivity training programs are more likely to improve their leadership skills than those who do not (as reported by their peers, superiors, and subordinates). Although definition of "leadership skills" vary with different studies there is evidence citing improved interpersonal behavior (e.g., accuracy of communications, changes in morale level) as well as studies showing improvement in productivity.

3. The incidence of serious stress and mental disturbance during training is difficult to measure, but it is estimated to be less than one

percent of participants, and in almost all cases occurs in persons with a history of prior disturbances (Schein & Bennis, 1965).

This section has attempted to describe human relations training–its purpose, philosophical beliefs, assumptions about learning and research base. The media consultant will, of course, draw his own conclusions. As he goes about the task of planning ways to influence learning in the affective domain, it is hoped that he gives some consideration to these hypotheses:

1. People learn more when they have the responsibility for designing their own learning experience.
2. People learn more when they have the skills that enable them to influence other people and, thereby, the social context of learning.
3. People learn more when their emotions and perceptions are seen as providing relevant and appropriate information.
4. People learn more when the people around them model the kind of behavior that is seen as desirable.
5. People learn more when they are clear about their relationships to significant others.
6. People learn more when self-assessment of performance is as valued as external assessment.

The Media Specialist as Innovation Consultant

What can be said about the relevance of the applied behavioral sciences, of which human relations training is one part, for the media specialist? I wish to focus on one part of this question and assume that the media specialist is among other things an "innovator" who has two functions:

1. to develop and implement innovation;
2. to develop and implement "innovative systems," i.e., he has the mission of helping others become innovators. He attempts to create persons and situations which are increasingly innovative and decreasingly dependent upon him.

Thus, in addition to technical competency, this role requires other competencies in order to build and maintain innovative systems, i.e., help others become innovators. It is to these latter competencies–those needed for introducing and maintaining innovations–that I wish to address the rest of this paper. I think the applied behavioral sciences are relevant for providing some mapping and planning of this process.

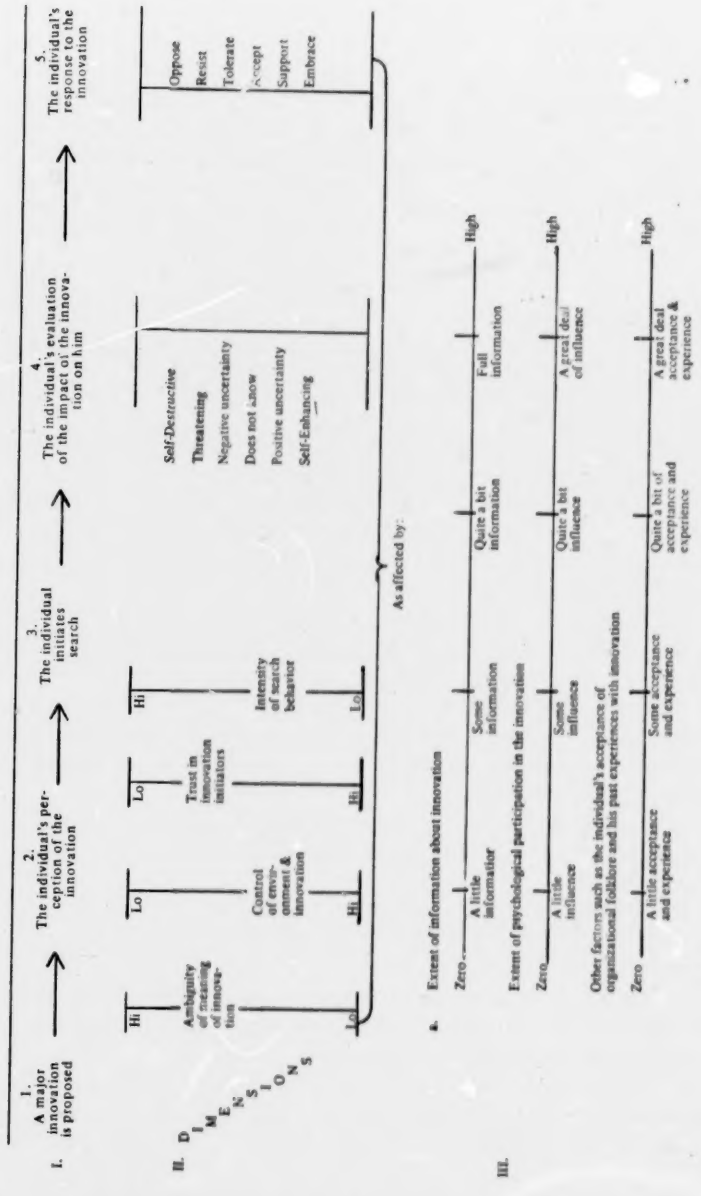
Before describing a way of looking at the process of planned innovation let me state some assumptions about people, organizations and change.

Some assumptions:

1. Most individuals wish to grow and develop.
2. Most individuals want their organization to succeed.
3. Most individuals tend to be resistant to innovation, particularly if goals or means toward them are unclear.
4. Individuals tend to support innovation more if they have participated in planning it.
5. Individuals can learn to improve their diagnostic skills to better analyze a situation and plan appropriate change.
6. Any change in a sub-system is likely to affect the whole system.
7. Every change effort involves changed attitudes. Attitudes must be unfrozen, new ones learned, and refreezing achieved.
8. A basic change is to create conditions where those affected by the change can systematically and meaningfully plan it and carry it out.
9. To change a sub-system, relevant aspects of the environment must also be changed.
10. The place to begin an innovation effort is where stress or strain or an identified problem exists—not necessarily at some arbitrary point in the system.
11. If basic structural changes are contemplated, change should start at the policy-making level.
12. A personal relationship of trust and mutual confidence must be established with each "client" as early as possible.
13. The innovator must deal with the dependency relationship usually existing in a helping relationship.
14. He should concentrate on diagnosis of the problem and avoid the temptations of early solutions.
15. He should control his own needs to control the situation or the client.
16. He should avoid
    - defending
    - advising
    - premature persuasion
    - over-controlling.
17. The innovator must build in plans for stabilizing and maintaining the innovation without undue dependence on him (Beckhard, 1967).

These assumptions can give one a framework for understanding certain critical issues in the innovation process, but it is a framework for "our ball park," the point of view of the innovator. How do things look, how is the innovator viewed from "their ball park," the educational constituencies involved? Figure 2 provides a way of understanding

Figure 2. Model for Understanding an Individual's Response to Innovation*



*Adapted from an instrument used in the Program for Specialists in Organization and Training Development, NTL Institute for Applied Behavioral Science, 1968.

the experiential world of the person whom the innovator hopes to influence.

One is vividly reminded of the fact that it is the person's *perception* of the innovator and the innovation, not objective reality that determines response. The human or "people" issues are at least as important as the technical quality of the innovation, especially when viewed from the "consumer's" frame of reference. Much effort is devoted to human relations training in industrial organizations in order to assist persons in adapting to change in their jobs. A relatively sophisticated behavioral science technology, frequently called "organization development" is resulting.

Innovation consultation

One can think of the innovation process from the standpoint of the knowledge, sensitivities and skills required by the innovator-consultant. He needs to be able to:

1. Diagnose the needs and problems of the client system. What is the trouble and what is the cause of the trouble?

2. Assess the motivation of the system to change itself. What are resources for and resistances to innovation? Is there awareness of the need for innovation? Are there feelings that innovation will be threatening? Rewarding?

3. Assess his own motivations and resources as the agent for influence and change. Why do I wish to help this person or this system? What are the limits of my ability to help?

4. Develop and maintain a working relationship with the client system. This means establishing a mutually acceptable and widely understood picture of the responsibilities of the innovator in helping the client solve his problem.

5. Choose the most effective role. Should the innovator counsel? Demonstrate? Encourage? Mediate? Communicate a wider view of reality to the client?

6. Select appropriate targets for innovation. Of all possibilities what are most significant? Realistic? What should be the first step in an experiment in innovation?

7. Encourage and support innovative attempts. What rewards can be provided for new responses? Remove rewards for old responses. Is the innovation consistent with the institutional standards?

8. Terminate (or redefine) the helping relationship. When and how does the innovation consultant leave the client alone?

Except for termination, these phases come up over and over in the

process of introducing innovations and helping others to become introducers of innovations.

There is a technology for this process which is emerging from applications of the behavioral sciences to organizational change efforts. One part of this technology is human relations training. Other parts are described in the materials cited in the list of references. And still others are quickly developing. It is exciting to work toward innovation and renewal in educational systems; it is especially exciting to aim toward the emergence of self-innovating, self-renewing educational systems.

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The Role of Educational Technology in Developing Achievement Motivation

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For the past seven or eight years we have been studying how to develop achievement motivation in students and adults. To understand what we have been trying to do it is necessary to say a word or two about what we mean by "achievement motivation," the "need to achieve" or as it is often abbreviated, "*n* Achievement." Initially we started out with a very simple idea—namely, that the measure of achievement motivation should sensitively reflect its presence or absence or variations in strength in a given individual. So we aroused achievement motivation in groups of college men and searched for a behavioral index which would give higher readings from the aroused students than from comparable groups of students whose motivation had not been aroused. To use a very crude analogy, we increased the fire under the boiler and searched for an indicator which would accurately reflect the increased steam pressure. We found that fantasy most sensitively reflected changes in motivational states and gradually over a period of years we discovered that certain types of fantasies—namely, those concerned with doing well, or doing better than one had done before, or improving performance—most accurately reflected increases in induced achievement motivation. We developed objective methods of coding fantasy for these types of imagery and referred to the frequency with which an individual introduced them into stories he wrote to pictures as his *n* Achievement (need for Achievement) score. This, of course, was only the beginning. The question was whether this index, if high, would accurately predict that a person would behave in ways that would generally be regarded as more motivated for achievement.

A number of behavioral theorists have argued that a motive drives, directs, and selects behavior. Thus a hungry person is more *active* normally, or more driven. He is also more directed toward certain aspects of the environment than others. He is much more alert to food cues in the environment than to cues, let us say, dealing with achievement. That is, if he is walking down the street he will notice a restaurant sign before he'll notice a book store sign. He will also learn how to overcome obstacles and get the food faster, if he is hungry. In some way the hunger drive serves to *select* out and stamp in the responses which lead to the food.

So we set out to discover whether our measures of *n* Achievement did in fact show whether individuals who scored high on it would behave as more motivated people should behave. In fact they did. They outperformed people with low *n* Achievement scores. That is, they seemed more *energized*. They improved in learning certain tasks faster. That is, the achievement motive seemed to help them *select* ways of solving the problems faster. And their attention was more often directed to achievement aspects of the environment. For instance, they tended to recall more often tasks which they had failed to complete–which were still challenging–whereas people with low *n* Achievement generally tended to recall completed tasks better.

For over twenty years we worked steadily on trying to find out what the behavioral characteristics were of people who were highly motivated to achieve as contrasted with those who were not. It is not possible to review much of this research, but one or two points are particularly worth mentioning. In the first place, it soon became obvious that the need to achieve did not lead to superior performance at all sorts of tasks. In fact, if it had, we could have used superior task performance itself as a measure of motivation. But a higher *n* Achievement did not lead people to perform better at routine tasks or tasks that had too little a chance of being successfully completed. It only led people to perform consistently better if the tasks were "challenging," that is, were neither too easy or too hard but had a moderate probability of success. Thus it is unsafe and incorrect to infer, as laymen often do, that whenever a person does better on a test, it must mean that he has a higher need to achieve. Good conscientious performance in school, for example, leading to higher grades, does not always or even often indicate a higher *n* Achievement. Also somewhat paradoxically a person's belief that he is achievement oriented is in no way connected with whether he gets a high *n* Achievement score. In other words, we must distinguish clearly between attitudes towards achievement and *n* Achievement. Again and again research has shown that people who value achievement in all sorts of ways as measured by attitude scales are not necessarily

those who generate spontaneously thoughts about achieving in creating fantasies in response to pictures. Perhaps it is best then to summarize by saying that what we mean by *n* Achievement is best conceived as a kind of spontaneously recurring concern to do things better, which a person may or may not be aware that he has. This spontaneously recurring concern leads the individual to be active in very specific ways. He seeks out challenging, moderately difficult tasks, does better at them, is very interested in feedback from the task as to how well he is doing, does not like to gamble or be directed by someone else as to what he should do, is restless and seeks out new tasks because the old ones get boring as the probability of succeeding at them increases.

Having built up a considerable body of information about the achievement motive and how it influenced individuals, we felt we should be in a good position to teach it to people. In fact we have turned out to be fairly successful in doing so. Since all of our research had shown that the characteristics of the person with high *n* Achievement should be particularly useful in an entrepreneurial role, we began by trying to develop achievement motivation in small businessmen more or less in charge of their own businesses. The results of these efforts are fully described in a book by myself and David Winter entitled *Motivating Economic Achievement* (The Free Press). In brief, we found that in short intensive courses lasting from 25 to 100 hours usually concentrated in 5 to 10 days, we could "turn on" small businessmen and make them much more entrepreneurial over several years following the training. In round numbers, about one-quarter to one-third of the small businessmen with whom we worked would become unusually active in any given two-year period if none of them underwent achievement motivation training. However, with such training, fully two-thirds of the men became active in the two years following it. The two-thirds rate of greatly improved performance held among all sorts of small businessmen —in black urban sections of the United States, in South Central India, or in Catalonian Spain.

Success with businessmen led us to try to develop achievement motivation among students in the public schools. As already noted, there is reason to believe that achievement motivation is less likely to lead to superior performance in the school situation than in an entrepreneurial one, for the simple reason that many school tasks are not "challenging." In fact, to do better, it is often wise to conform and do conscientiously exactly what the teacher asks you to do. Perhaps for this reason our success in improving performance in schools has been less dramatic, though it is still substantial and perhaps greater than many of the other compensatory education programs that are so much in vogue today. To report the results of just an example of many attempts to introduce

achievement motivation training into the schools, the work by deCharms *et al* (1969a) in St. Louis is fairly representative of what has been accomplished. They introduced achievement motivation training for over 250 black disadvantaged pupils in nine sixth grade classes. At the end of the year control children who had not received the training scored about a grade level behind where they should be on the Iowa Test of Basic Arithmetic Skills. The comparable children who had received motivation training were only half a grade behind. That is, by practicing some simple motivational exercises which the teachers had been trained to introduce (see deCharms, 1969b), the disadvantaged children had gained about half a grade in arithmetic skills after achievement motivation training over those who had not received the special training. The result is very encouraging, particularly in view of the many discouraging reports coming in from other attempts at compensatory education.

In planning and carrying out these many courses for developing achievement motivation, we have been constantly experimenting with methods of improving their yields. In fact our initial approach was frankly experimental, in the sense that we were thinking in terms of a kind of input-output analysis. That is we identified some twelve different educational inputs that could conceivably help develop achievement motivation, (McClelland and Winter, 1969) and then tried to find out which combination or combinations of them would give the highest yields in terms of such criteria as improved entrepreneurial performance or academic skills. Let me describe very briefly the nature of some of these educational inputs under four major headings:

The achievement syndrome. Here our goal is very simply to teach the participants what we have learned about how a person with high *n* Achievement thinks, talks and acts and why having a high need to achieve is relevant to, let us say, entrepreneurial success. To understand the thought patterns, they learn the coding system for *n* Achievement and eventually learn to produce easily and spontaneously stories that score high in *n* Achievement. They also practice the action characteristics of people with high *n* Achievement, such as choosing moderately difficult tasks in certain game situations, as in deciding how far to stand from a peg in ring toss.

Self-study. Here various exercises are introduced to get the person to think what kind of a person he is and wants to be. Privately and in groups (using some sensitivity training procedures) they discuss their motives and aspirations, the objective being to decide the role, if any, that they want achievement motivation to play in their lives.

Goal setting. They are also taught how to set realistic goals for themselves in terms of the weeks and months ahead. Most people begin with very vague goals, but the training procedures force them to set quite specific time-limited goals and invent measures of progress so that they will know afterwards the extent to which they are achieving them. Thus they normally end the training with certain commitments for the days ahead and with concrete ways of knowing whether they are fulfilling those commitments or not.

Interpersonal supports. Since the training is done in small groups of around 15 participants, it is relatively easy to create certain "in-group" feelings which research has shown tends to support individuals in their efforts to change after they leave the training situation. Often the training is carried out in relatively isolated retreat settings which give the individual the opportunity to reflect on his life and form new associations with others which will continue to support and guide him when he returns to everyday living.

The theoretical reasons for thinking that each of these types of inputs might develop motivation are fully described elsewhere (McClelland and Winter, 1969). All we need concern ourselves with here is what was learned about how to produce the greatest improvements in subsequent performance of the participants. Somewhat to our initial disappointment, we could not really conclude that any particular educational input was either absolutely essential or sufficient. Nor did any particular combination of inputs seem especially effective. Instead the simple conclusion that could be drawn from a very complex series of training attempts was that *the more different educational inputs were utilized, the greater the yield of the course tended to be.* At this point it seemed useful to stop thinking about our training as if we were conducting a series of agricultural experiments in which we would try to discover what combinations of fertilizers (educational inputs) would produce greater crop yields (improved performance). Instead we found it more helpful to think of our courses as if they were productions of a play in which various theatrical devices could be employed to create an atmosphere of expectancy, self-confidence, and commitment to future action. Thus, if one thinks of the effectiveness of a play in reaching the audience, it seems somewhat irrelevant to test whether it would get across as well if it were done without lights, or without dialogue, without a set or costumes, or perhaps even without acting as in a play reading. While such variables can be easily identified and introduced or left out, they somehow do not appear to be the absolutely critical ones so far as

getting the play across is concerned. Thus it is entirely possible to have a very effective play reading, or pantomime without words, or perhaps even an entire drama acted out in the dark. Normally of course it is easier to produce an effect if all of the inputs—lights, costumes, set, dialogue, etc.—are present, which is exactly what we found, but it is also entirely possible to have all of these elements present and still produce a play which is a flop—which is also what we found. That is, we have had the experience of trying to put on courses where all of the inputs that we had identified were "present," yet the courses were clearly failures, even in the elementary sense that the participants left in disgust before they were over.

It was at this point that we began to get seriously interested in educational technology. For educational technology should be helpful in selling the course to the participants, in creating at atmosphere which is conducive to learning and increased self-confidence, and in making the information to be presented more vivid and understandable. In fact, we had found it essential to make use of elements of educational technology from the very beginning, although it is only recently that we have begun to do so seriously with a self-conscious attempt to understand how and why they work. Thus for example, we concluded very early that set and setting could be quite important in motivational learning. In very simple terms, we found that a strictly academic classroom setting, with the teacher lecturing and "pupils" writing out various exercises was certainly not as effective—at least for adult businessmen and certain types of disadvantaged pupils—as taking everybody out to a retreat setting in the country where they could be away from the distractions and boredom of everyday living and exposed to a new "total" environment which would put them in a better mood for self-examination and change. Or to take another simple example, when we wanted to teach people the principles of moderate goal setting, we found it nowhere near as effective to teach this with paper and pencil tests as with a simple ring toss game in which each participant would have to get up physically and try to throw several rings over a peg under various varying circumstances (first while others watched, with the possibility of a money reward and so on). In fact, at this stage we found such participating exercises so useful in keeping interest that we came to realize that many traditional psychological tests could be used for training purposes. That is, psychologists have been extremely ingenious over the past fifty years in developing [illegible] tests of various skills, interests, attitudes, motives, and academic achievements. These may be fun for the tester and useful to him in the sense of predicting who is suited for one type of activity or another, but they are little fun for the testee because he doesn't learn anything from them. The information gathered on his behavior is to

help the tester make a decision, not to help the testee understand and improve his behavior. But obviously there is no reason why any testing device cannot be turned into a teaching device. Instead of keeping the information to himself, the psychologist can give it back to the testee. He can explain how to get a better score on intelligence tests by teaching the person to do better on tasks that make up the I.Q. scale. He can explain how to react to Rorschach Inkblots in ways that show he has a well-organized approach to the environment. Or as in our training, he can help the participant write stories that score high for *n* Achievement, or help him set moderate levels of aspiration and respond realistically when he fails to achieve them. Under these new rules of the game, we have found that participants are fascinated with tests and will spend hours trying to understand how they work and what their own behavior on them means. Thus in the most elementary sense, we have taken educational testing technology both from the experimental laboratory and from the personnel or clinical psychologist's test shelf and used it for training purposes.

But obviously this is only a first and rather unsophisticated step. Such problems still remain as: why are such games or tests so interesting to participants? How can their effectiveness be increased? What other types of educational technology can be invented or utilized to help develop motivation? It is in these areas that we are currently working and while we have no very hard data to present, at least we have developed some interesting new approaches based on our past experience that we believe are worth serious consideration. The easiest way to describe and demonstrate them seems to be to list them under the various *functions* which educational technology can perform, at least in theory, in developing motivation.

Conveying information better. One of the oldest and simplest uses of educational technology is to present information simply, clearly and vividly so that people can understand it better. Not long after my book, *The Achieving Society*, was published in 1961, the American Psychological Association under a grant from the National Science Foundation sponsored a film summarizing the major findings reported in the book. It is entitled "The Need to Achieve" and is available from the Audio-Visual Center at Indiana University. It is essentially an educational documentary in which I tell the story of the research findings illustrated by various shots of experiments in progress showing the types of motivated behavior I am talking about. We often use the film in our training courses simply because it condenses a great deal of written material in a short period of time and provides a welcome alternative to the reading assignments which the participants in the courses are also given.

In teaching the scoring system for *n* Achievement we have also found

a variety of visual aids to be helpful. For instance, the picture of a typewritten text of the story enables the instructor to actually point to the phrases which are scored in a certain way. Or the various types of verbal imagery may be illustrated by pictures which show as vividly as possible what is meant, let us say, by a scoring category like "anticipating a successful outcome of performance." In fact when we were giving the course to Arab farmers in a North African country, we were forced to rely entirely on pictures with oral explanations, because they were illiterate.

These are fairly obvious ways of improving or "decorating" the message to be conveyed. Even more importantly the media may be used to show varieties of behavior that are not easy to describe verbally or to elicit in a classroom situation. For instance, in any given group of 12 to 15 participants, it may turn out that no one will "grandstand" in the ring toss game. That is, no one may decide to stand as far from the peg as possible throwing wildly across the room in order to earn the smiles of the bystanders for being such a big risk taker or a big loser. Yet this is a type of behavior that is very important to observe in giving instructions about goal setting and therefore it is useful to at least have a film or slide presentation of it so that the discussion of its meaning can take place realistically. Furthermore we often want to talk about how people display such goal setting behavior in real life as well as in game situations in the training sessions. It may be easy for the group to see the analogy with the basketball player who keeps shooting from the center of the court but more difficult to understand how it would show itself, say, in the classroom in deciding what kind of questions to volunteer to answer or what kind of theme to decide to write. Again it is common to ask participants to bring examples from their own lives, but it is helpful in getting them started to present some scenes from everyday life that they can be asked to try to explain in terms of the goal setting principles they have just been practicing. In all of these cases, technology is used essentially to amplify, clarify, or improve the message which the teacher would normally try to convey by verbal explanations and perhaps some diagrams drawn on the blackboard.

Arousing attention. When we first started designing our achievement motivation training courses for the schools, I visited a typical high school classroom for the first time in over 35 years. What struck me most forceably—and of course I should have remembered it but I really hadn't—was the relatively small amount of time that the students were paying attention. The teacher was excellent. She was using the lecture-discussion method with points written on the blackboard from time to time to underline their importance. A few students near the front of the class seemed to be paying attention practically all of the time. A few

near the back, where it was hard to hear anyway, seemed not to be paying attention at all. And most of the students seemed to be paying attention only about half the time. The rest of the time they were drawing pictures, fiddling with their pencils or notebooks whispering or passing messages, or looking out the window. Yet this was by no means a disorderly classroom. In fact my impression is that it was fairly typical. So if you multiply the number of minutes in a classroom times the number of pupils in the room you come out with something like "pupil exposure minutes," and it is certainly not unreasonable to assume that the teacher's message was being attended to at most for half of those minutes. So a major problem in education–a much bigger problem than most educators realize–is getting attention so that messages, no matter how clearly presented, will actually be received. In fact recent learning theory suggests attention is perhaps more important than that old standby in American psychology "reinforcement" or reward. Rewards, in fact, may simply be ways of getting attention which produces learning and there are of course many ways of getting attention other than by giving rewards. The problem is particularly acute with certain disadvantaged groups or potential dropouts who are already "tuned out" to normal educational inputs. With them it is particularly vital to find some way of getting their attention or they won't receive any of the educational messages at all.

For this purpose educational technology is particularly important. It has infinitely greater range than the average classroom teacher. Getting attention seems to be largely a function of exposing a person to stimuli which are moderately discrepant from expectation. That is, if what happens is fully expected, it is experienced as routine and boring. If it is totally unexpected, it is shocking, disorganizing and experienced as unpleasant. What maximally produces focused attention are events which deviate a little from prior expectation . . . "something old something new . . ." Film strips, slide and light shows, movies, games, novel workbook exercises–all such techniques are ways of capturing the attention of students who are bored with more conventional ways of instruction. And we have used them all. As noted above, in some extreme cases we have found it better to remove course participants altogether from their familiar environments so that they may be "totally immersed" in a new situation in which all sorts of educational technology engage their attention from one end of the day to the next. Under these conditions we have found that we get a total involvement by the participants that most classroom teachers would really envy.

We have prepared a media presentation on the ring toss game as an example of an approach that provides a certain amount of information and "grabs" attention. It is one thing to talk about various types of

performance in the ring toss game; it is quite another to experience those varieties vividly and personally in a series of constantly changing scenes presented by multiple slide projectors, overlaid with voices reacting to various types of achievements. The hope is that every member of the audience will be grabbed personally by some scene or some comment, although our experience is that different people are grabbed by different stimuli. (Demonstration).

Arousing and sustaining achievement motivation. The ring toss presentation gets attention, and should provoke discussion, but media technology offers other possibilities. It is not only important to get attention, but that is the *sine qua non* for receiving any kind of message; it is also desirable to do it in such a way as to arouse the desire to achieve. Actually some of our earliest research dealt with arousing achievement motivation in college men by instructions telling them that we were testing their intelligence and leadership capacity. Thus we have long known that what people say can create an achievement-oriented atmosphere which increases the frequency with which people think achievement thoughts. In fact we have long suspected that even the tone of voice with which an experimenter gives some standard instructions will affect how achievement oriented the atmosphere is because we once or twice ran across people who seemed not to be able to convey an achievement orientation to a group, even though they were saying the same things as other people who could convey it. More recently Klinger (1966) has shown that just watching an examiner who is present in front of a class but not saying anything can increase the frequency with which achievement-oriented stories are written by students in the room. If his posture is erect and attentive, if he carefully erases the blackboard, looks at his watch repeatedly, adjusts the shade on the window, etc., he can create an achievement-oriented climate that is reflected in the stores written by those watching him. On the other hand, if he sits down in front of the class, smiles, relaxes and lights a cigarette there is very much less achievement imagery in the stories written by the students subsequently. In short we know how to make achievement more salient in a given situation at least temporarily. What we do not know yet is how to sustain an achievement orientation over a period of time or to make sure that it lasts after the training sessions are over. We are now experimenting with tapes of various kinds which not only present achievement images in vernaculars that our participants will readily understand, but in ways which will create achievement-oriented moods which hopefully will last beyond the short period in which the tape is presented. Our hunch here is that some of the non-verbal aspects of vocal communication are particularly important for stimulating the emotional experiences which seem to us to be central to getting people

permanently interested in doing better at the various jobs they undertake. There is a fair amount of evidence now that the emotional quality of a message is carried much more by vocal characteristics than by the words actually used. Thus, Milmoe and others (1968) have shown that emotions can be correctly recognized in such messages even when the words are filtered out in such a way as to make them unrecognizable. It is in this area that we hope to find clues for conveying the emotional and motivational aspects of our messages about achievement more effectively.

Stimulating fantasy. Part of our training has always involved developing a richer and more varied fantasy life. That is, since we argue that a motive in a sense is defined as an inner concern over doing well, we have sought ways of training people to develop fantasies of this type. At the simplest level participants are encouraged to write more vivid and dramatic stories in the achievement area. However, some people need to be "opened up" or released from a rather conventional fantasy life. Three techniques have proved helpful. One involves presenting films that break out of conventional modes of thinking about objects, experiences or events. For instance, we have used a film on "Time" which shows how differently events are experienced if time is collapsed or expanded. Simply showing a film in slow motion illustrates the point in a very rudimentary way. More elaborate spectacles like the TV serial "Star Trek" or the film "2001" break through the bounds of time more dramatically. Or we have also used a film entitled "The Eye of the Beholder" which shows the same event from some half-dozen points of view apparently as actually experienced by the different participants in the event. The differences are in some cases so striking that it is difficult for the audience to figure out in the end exactly what did happen. Here technology is used essentially to loosen up the participants, to get them started thinking along new and different lines.

Another approach is to bombard the participants with a wide variety of images of scenes, places and acts as in a light show. That is, once he is no longer thinking along conventional or routine lines, it may be helpful to provide him with some new images for thoughts that he can weave into his own fantasies subsequently.

The audio-visual matrix you are about to see is intended to stimulate a variety of fantasies associated with the need to achieve, and also to arouse and sustain the psychological quality of achievement motivation. Although the program does provide a certain amount of information, this is not its primary educational function. We were attempting to recreate the experience of achieving, rather than defining it or demonstrating its behavioral consequences. (Demonstration).

Finally there is considerable evidence that fantasy is stimulated by

meditation and quiet. Maddi (1968, p. 435 ff.) has shown that monotony and boredom produce at least a passive need for novelty. Lerner (1967) has argued that the dream deprivation experiments demonstrate conclusively that there is a positive need to dream that must be fulfilled. When people are prevented from dreaming by being awakened whenever their brainwaves show signs that dreaming is beginning, they will make up for that lost dream time the next night that they are allowed to sleep without interruption. Thus, one can argue, as she does, that the quiet motionless state of sleep promotes the kinesthetic type of dreaming that is essential for normal living. It would seem to follow that sitting quietly and meditating in a relatively motionless state with minimal external stimulation should also facilitate fantasy. Here again educational technology can play a role in discovering what kind of total environment, including lights, sound, and visual imagery, produces the best kind of "meditation chambers." We have experimented with silent meditation in our training groups, although as yet little is known about the environmental conditions which promote it, except what is handed down from the traditions of various groups like the Quakers or other religious orders which practice it. In these traditions emphasis is placed on minimal stimulation of all types. Thus while at times we want light shows to suggest new fantasies, at other times, we want quiet to encourage self-directed fantasy.

Encouraging participation. A major objective of our motivational training is to get the person to assume the direction of his own life, to feel self-confident, to act like an origin rather than a pawn to use deCharms' vivid distinction (1969b). He must feel competent and self-reliant, capable of improving performance, rather than helpless, weak and uncertain as to how to cope with the overwhelming forces that push him around. So it is extremely important to get him out of his chair participating in various role playing situations or games in which he must generate spontaneously responses that will prove to him that he is in fact capable of acting without always being told what to do. So participants not only write their own stories, they score them. They not only observe other people playing the ring toss game, they have to commit themselves to throwing from one distance or another and explain afterwards why they made the choices that they did. They have to set concrete goals for their own lives and figure out ways in which they will be able to keep track of how closely they are achieving their goals after the course. In many ways they come to feel more confident precisely because they feel they understand themselves better and have gained psychological insights through the experiences they have had that other people do not have. Thus they are in a better position to control and plan their own lives.

Educational technology in the form of games and exercises is obviously essential here. Films, slides and tapes can also help if they are used to elicit argument, to shock and disturb. However, as they are often used, they can create a problem by setting up an audience situation in which everyone is a passive observer rather than an active participant. That is, used in traditional ways, they may encourage passivity in the sense of: "Show me something new. I liked that one. What else have you got up your sleeve?" It is a common observation that it is the people who make the slide shows, set up the equipment, worry about conditions of projection, take the pictures, edit the sound tapes, etc., who genuinely *participate* and probably develop some achievement motivation in the process. Unfortunately the audience ordinarily does not participate. It just watches and listens.

Educational technologists protest that it is not absolutely essential to be passive in such situations. People can write on TV picture tubes. They can take their own pictures, cut and edit their own tapes and films, choose what channel to watch or listen to, what sequence of slides to show, etc. Nevertheless these things are normally not done and to date we have very little success to report in this particular area. For one thing it seems to require a very expensive type of individualized instruction if the person is to genuinely interact with a tape recorder or a slide projector or a camera. Nevertheless we are making concerted efforts to develop some new approaches in this area because we feel that participation is so central to developing achievement motivation. In the meantime our classroom games and exercises and shows which arouse discussion perform this function very well.

Making self-study easier. One of the advantages of educational technology is that it can record a person's behavior so that he can observe it again afterwards or as many times as he wants to. At the simplest level he can write his own stories and then go back and code them for *n* Achievement. We have also experimented with sound recordings or video tapes of discussions that are played back the next day to give people an opportunity to analyze and understand more objectively how they were reacting. It is obvious that in the heat of the moment a person may be so focused on some aspect of the situation, such as expressing his displeasure, that he may totally fail to notice what other people are doing or saying or perhaps even what kinds of expressive movements he himself was making at the time. People are really interested in themselves. They normally, at least by the time they are adults, have a pretty good idea of what kind of a person they are. That is, they have learned to code their thoughts or actions in certain standard ways such as "I feel bad when people criticize me" or "I am usually a pretty cheerful person." Yet consistent exposure to their gestures, patterns of interactions

with others, or even the sound of their own voices as heard by an outsider almost always injects new information into the picture which forces the person to revise his opinions about himself. This kind of revision in the self-picture is almost always essential if the person is to incorporate a stronger need to achieve into himself as a new concern which is going to occupy more of his time in the future than it has in the past. To help give the person new information about himself, to break up his conventional ways of thinking about himself, it is essential to use educational technology of some sort.

Making available methods for developing achievement motivation on a large scale. As a psychologist who has been in the business for over thirty years now, I am becoming more and more aware of how slowly psychological knowledge is disseminated to the public. As a young scientist, I held to the somewhat naive view that if psychologists ever happened to hit on something useful, "society" would naturally find a way of making it available to the public at large. I've learned to become very skeptical about the transmission of knowledge in a useful form. The process of dissemination appears to be very slow and uncertain. For example, psychologists have known how to cure bed wetting in at least three-quarters of the cases for at least thirty years and perhaps as long as 100 years. Yet there are still hundreds of thousands of children suffering from bed wetting in the United States and hundreds of thousands of miserable parents who should be more than delighted to know about this technique. Yet it is not being adequately disseminated to this day. Pediatricians do not recommend its use for reasons that appear to be wholly without foundation. Here is a clear case where an important and useful bit of knowledge is simply not being adequately transmitted to the public (see McClelland, 1969).

The state of our research knowledge about achievement motivation development seems somewhat analogous. We have conducted perhaps thirty or more training courses for groups as varied as Indian, Oklahoman or black American businessmen and high school dropouts, and in nearly all cases there are significant improvements in achievement orientation and some aspects of performance. This seems to be a bit of psychological knowledge that ought to be useful to the public on a fairly large scale. Yet how is it to be disseminated? Certainly it does not seem possible for me to do much more along these lines. I am primarily a scientist, not a professional or businessman. There are still some very interesting research problems to be worked out in the motivation development area, but in the meantime who is to get what we do know to the people who need it? This is by no means a trivial problem in social engineering. Jensen (1969) has contended, for instance, that even in the few cases where compensatory education has succeeded in pilot projects,

efforts to apply it on a wider scale seem to have failed for the most part. One of the doubts that has plagued us all through the period when we have been running these courses has to do with whether our effects are somehow dependent on some very special characteristics of the trainers involved. Does it in fact require some very special skills or psychological insights to run these motivation development courses successfully? If so, it might be quite impossible to expand the training much beyond the slow sponsoring of a few pilot courses much as we have been doing for the past four or five years.

It is this problem which has led us to turn with some hope to educational technology. Certainly instructors will have to be trained to give these new types of courses but just as certainly they will not give them if they do not have attractive, packaged materials available for use in giving them. In fact it is our view that having the materials available on an inexpensive basis will in fact encourage many more teachers to learn how to use them. The history of the development of technology in this country from typewriters to computers suggests that if a useful inexpensive gadget is available, people will learn to use it. It is for this reason that we have been collaborating with Educational Ventures, Inc. and Intermedia Systems Corporation to mass produce inexpensive educational materials in modular form for achievement motivation training in the schools and business. You have in your hands a brochure describing materials available for teaching achievement motivation in the schools prepared by Educational Ventures, Inc. (Middletown, Conn.) by special arrangement with our achievement motivation development project supported by the Office of Education. It is our hope that if principals and teachers learn that these materials are available and read what effects they have produced when used previously, they will find ways of getting people trained to use them. Actually of course, a number of teachers already know how to use such materials, but are inhibited from applying their knowledge more generally because, up to now, they have been supplied with materials by researchers who have no interest in continuing the courses once they have collected their data and gone home to write their research papers and monographs. This has left some teachers with copies of odd forms and exercises which they might in theory duplicate and continue to use, but in practice we find that they do not, even though they are impressed with the success of their previous efforts. We feel that making the materials attractively and inexpensively available is one of the best ways to insure that this particular piece of psychological knowledge is more generally applied.

But the courses should also not depend too heavily on superb teachers if they are to be widely used. Most school teachers simply cannot be expected to have superb psychological or social insight. They may not

find it easy always to think of vivid and dramatic examples of achievement-related thoughts or actions to discuss with the class. It is for this reason that we have been collaborating with Intermedia to help them produce the best kinds of tapes, slides, and films for supplementing or dramatizing the educational inputs necessary to produce increases in achievement motivation. Some educational technologists talk about making their materials "teacher-proof" in the sense that no matter how bad the teacher is the materials will somehow get the message across. We certainly do not aspire to have programs that will work without an instructor or with a poor instructor, but we do feel that it is important to provide the average instructor with the kinds of technology that will accomplish the goals listed above—that is, which will convey information simply and vividly, arouse attention, create and sustain an achievement-oriented mood, stimulate fantasy, encourage participation and make self-study easier. For if we think of the motivational courses as a play and the instructor as the producer, his job will certainly be much easier if we provide him with a script, with costumes, with lights, with films, with slides and with tapes. He will still have to orchestrate all of these educational aids into a meaningful production, but he should be infinitely better off than if he had only his own voice and a blackboard.

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The Effects of Anxiety on Computer-Assisted Learning

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During the past half-century, two very different approaches or orientations to the discovery of psychological laws have emerged. The first of these orientations is concerned with general psychological processes that are found in all behaving organisms. The second emphasizes the study of individual differences in behavior.

Psychologists who study general processes tend to use experimental methods in which they manipulate selected variables and rigorously control others. Such procedures permit them to test explicit hypotheses regarding the effects on behavior of specific changes in environmental conditions, and to formulate precise laws relating behavior to its antecedents. Psychologists who study individual differences are also interested in relationships between environmental factors and behavior, but their approach to psychological research does not usually involve experimental manipulation. These differential psychologists are concerned primarily with discovering correlations between already existing variations in behavior and a wide range of environmental circumstances, not just those that can be manipulated.

In his presidential address to the American Psychological Association, Cronbach (1957) discussed the divergence in goals and methods of

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psychologists mainly concerned with general processes and those primarily interested in individual differences. He believed this divergence was so fundamental and profound that he entitled his address, "The two disciplines of scientific psychology." In recent years, however, efforts have been made to combine and integrate these two approaches to scientific psychology. Such integrative efforts are perhaps most clearly reflected in studies which have investigated the influence of individual difference variables on the learning process.

Progress towards the unification of experimental and differential psychology in the learning area was assessed in a symposium on 'Learning and Individual Differences' held in 1965 at the University of Pittsburgh (Gagné, 1967). The compelling conclusion that follows from reading the papers presented at the Pittsburgh conference is that the integration of individual differences with learning theory is, as yet, minimal. In his comments on these papers, Melton suggested a strategy which might be effective in bringing about the needed integration. According to Melton: "What is necessary is that we frame our hypotheses about individual difference variables in terms of the process constructs of contemporary theories of learning and performance." (1957, p. 239)

The major goal in this chapter is to formulate hypotheses about the effects of individual differences in anxiety on the learning process. These hypotheses will be framed in terms of the learning constructs of a theory of emotionally based drive proposed by Spence (1958) and Taylor (1956), and tested in experiments on computer assisted instruction. The paper will be divided into five sections. In Section I, the fundamental nature of anxiety phenomena will be considered in historical perspective. In Section II, a trait-state conception of society will be described. Spence-Taylor Drive Theory and the empirical evidence supporting it will be briefly reviewed in Section III. In Section IV, experiments on the relation between anxiety and performance in computer-assisted learning will be reported. Finally, in Section V, implications of research on anxiety and learning for the performance of school children in the classroom will be discussed.

I. Theory and Research on Anxiety

Anxiety is regarded as a principal causative agent for such diverse behavioral consequences as insomnia, debilitating psychological and psychosomatic symptoms, immoral and sinful acts, and even instances of creative self-expression.[2] Recognition of the importance of anxiety as a

[2]The research on anxiety and computer-assisted learning reported in this chapter was carried out in collaboration with Dr. Duncan N. Hansen and Mr. Harold F. O'neil whose contributions to this paper are gratefully acknowledged.

powerful influence in contemporary life is reflected in the following passage from *Time:*

> Anxiety seems to be the dominant fact—and is threatening to become the dominant cliché—of modern life. It shouts in the headlines, laughs nervously at cocktail parties, nags from advertisements, speaks suavely in the board room, whines from the stage, clatters from the Wall Street ticker, jokes with fake youthfulness on the golf course and whispers in privacy each day before the shaving mirror and the dressing table. Not merely the black statistics of murder, suicide, alcoholism and divorce betray anxiety (or that special form of anxiety which is guilt), but almost any innocent, everyday act; the limp or overhearty handshake, the second pack of cigarettes or the third martini, the forgotten appointment, the stammer in midsentence, the wasted hour before the TV set, the spanked child, the new car unpaid for. (*Time,* March 31, 1961, p. 44)

The current interest in anxiety phenomena has many historical antecedents. For example, a conception of fear or anxiety may be found in ancient Egyptian hieroglyphics (Cohen, 1969). James Kritzeck of the Department of Oriental Studies at Princeton notes a central concern with anxiety phenomena in the work of the medieval Arab philosopher, Ali Ibn Hazm of Cordoba. In a treatise entitled "A philosophy of character and conduct," written in the 11th century A.D. Hazm states:

> I have constantly tried to single out one end in human actions which all men unanimously hold as good, and which they all seek. I have found only this: The aim of escaping anxiety. Not only have I discovered that all humanity considers this end good and desirable but also that no one is moved to act, or resolves to speak a single word, who does not hope by means of this action or word to release anxiety from his spirit. (Kritzeck, 1956, p. 573).

Whatever the historical forerunners, it was Freud who first attempted to explicate the meaning of anxiety within the context of psychological theory. He regarded anxiety as "something felt"—a fundamental, unpleasant emotional state or condition (Freud, 1924). This state, as Freud observed it in patients with anxiety neurosis, was characterized by "all that is covered by the word, nervousness, apprehension or anxious expectation, and efferent (physiological) discharge phenomena." Specific symptoms in anxiety states included heart palpitation, disturbances in respiration, sweating, tremor and shuddering, vertigo, and other physiological and behavioral manifestations. For Freud, anxiety was distin-

guishable from other unpleasant affective states such as anger or grief by its unique combination of phenomenological and physiological qualities. These gave to anxiety a special "character of unpleasure."

In his early theoretical formulations, Freud believed that anxiety resulted from the discharge of repressed somatic sexual tensions which he called libido. When libidinal energy was blocked from normal expression, it accumulated and was automatically transformed into anxiety or into symptoms that were anxiety equivalents. Freud (1936) subsequently modified this view in favor of a more general conception in which the functional utility of anxiety was emphasized. In his later theoretical conception, Freud regarded anxiety as a *signal* indicating the presence of a dangerous situation, and he differentiated between objective anxiety and neurotic anxiety largely on the basis of whether the source of the danger was from the external world or from the individual's own internal impulses.

For Freud, anxiety was the "fundamental phenomenon and the central problem of neurosis" (1936, p. 85), and understanding anxiety was considered by him to be "the most difficult task that has been set us," a task whose solution required "the introduction of the right abstract ideas, and their application to the raw material of observation so as to bring order and lucidity into it" (Freud, 1933, p. 113). The complexity of this task and Freud's personal commitment to it are reflected in the fact that his theoretical views on the subject of anxiety evolved over a period of nearly 50 years, were continually modified, and were never regarded by him as complete.

Clinical studies of anxiety have appeared in the psychiatric literature with increasing regularity since 1894 at which time Freud first conceptualized anxiety neurosis as a discrete psychopathological syndrome to be distinguished from neurasthenia. Following Pavlov's discovery of experimental neurosis more than a half-century ago, there have been numerous experimental investigations of fear, frustration, and conflict in animals. In the past two decades, however, empirical research on anxiety has dramatically increased. During this period, more than 2,000 studies have been indexed under the heading "anxiety" in *Psychological Abstracts,* and over 3,000 studies have been indexed under "anxiety" or "anxiety-neurosis" in *Excerpta Media* and *Index Medicus.* Inasmuch as there is surprisingly little overlap between the psychological and medical literature, it seems safe to estimate that over 4,000 articles or books on anxiety have been published since 1950.

While theory and research on anxiety have proliferated, this has not led to a consistent body of empirical findings, nor to convergence among theoretical interpretations. The distinguished scientists and clinicians who have made important contributions to the understanding of

anxiety phenomena have, unfortunately, approached the problem of anxiety with their own unique theoretical perspectives and research objectives (Spielberger, 1966a). Consequently, despite the magnitude of the research effort, lack of agreement regarding the nature of anxiety, the particular stimulus conditions that arouse it, and the experiences that make individuals more or less vulnerable to it is still the rule rather than the exception. Indeed, our knowledge of anxiety today is not very different from what it was in 1950 when Hoch and Zubin introduced a symposium sponsored by the American Psychopathological Association with the following statement:

> Although it is widely recognized that anxiety is the most pervasive psychological phenomenon of our time and that it is the chief symptom in the neurosis and in the functional psychoses, there has been little or no agreement on its definition, and very little if any progress in its measurement. (1950, p. v)

Given the prevailing interest in anxiety phenomena, and the extensive amount of empirical work that is being done, the need for a comprehensive theory of anxiety is obvious. In the next section, a trait-state conception of anxiety is proposed as a theoretical framework for classifying existing knowledge of anxiety phenomena and guiding future research.

II. State and Trait Anxiety

Research findings suggest that an adequate theory of anxiety must distinguish conceptually and operationally between anxiety as a transitory state and as a relatively stable personality trait. It is also apparent that a comprehensive theory of anxiety must differentiate between anxiety states, the stimulus conditions that evoke these states, and the defenses that serve to avoid or ameliorate them (Spielberger, 1966a). In this section, two different anxiety constructs, state anxiety (A-State) and trait anxiety (A-Trait), will be defined. A trait-state theory of anxiety will then be proposed in which the relationship between these concepts is clarified.

State Anxiety (A-State) may be conceptualized as a transitory emotional state or condition of the human organism that varies in intensity and fluctuates over time. This condition is characterized by subjective, consciously perceived feelings of tension and apprehension, and activation of the autonomic nervous system. Level of A-State intensity should be high in circumstances that are perceived by an individual to be threatening, irrespective of the objective danger; A-State intensity should be relatively low in objectively nonstressful situations, or under

circumstances in which an existing danger is not perceived as threatening.

Trait Anxiety (A-Trait) refers to relatively stable individual differences in anxiety proneness, that is, to differences in the disposition to perceive a wide range of stimulus situations as dangerous or threatening, and in the tendency to respond to such threats with A-State reactions. Persons who are high in A-Trait tend to perceive a larger number of situations as more dangerous or threatening than persons who are low in A-Trait, and to respond to threatening situations with A-State elevations of greater intensity. A-Trait may also be regarded as reflecting individual differences in the frequency with which A-States have been manifested in the past, and in the probability that such states will be experienced in the future. Anxiety scales which require individuals to report how often they have experienced symptoms such as "worrying" or diarrhea would thus appear to be measures of A-Trait.

A major task for a trait-state theory of anxiety is to identify the characteristics of stressor stimuli that evoke differential levels of A-State in persons who differ in A-Trait. Atkinson (1964) suggests that a "fear of failure" motive is reflected in measures of A-Trait, and Sarason (1960) emphasizes the special significance for high A-Trait individuals of situations that arouse self-depreciating tendencies. On the basis of a review of the research findings obtained with various anxiety scales, Sarason concludes:

> . . . the bulk of the available findings suggest that high anxious *S*s are affected more detrimentally by motivating conditions or failure reports than are *S*s lower in the anxiety score distribution . . . It is interesting to note that high anxious *S*s have been found to be more self-deprecatory, more self-preoccupied and generally less content with themselves than *S*s lower in the distribution of anxiety . . . it may well be that highly motivating or ego-involving instructions serve the function of arousing these self-oriented tendencies. (Sarason, 1960, pp. 401-402).

Experimental investigations of anxiety phenomena have produced findings that are generally consistent with Atkinson's suggestion that fear of failure is a major characteristic of high A-Trait people, and with Sarason's conclusion that ego-involving instructions are more detrimental to the performance of high A-Trait individuals than persons with low A-Trait. In general, the experimental literature on anxiety appears to indicate that situations which pose direct or implied threats to self-esteem produce differential levels of A-State in persons who differ in A-Trait.

Although failure or ego-involving instructions evoke higher levels of

A-State intensity in high A-Trait subjects than in low A-Trait subjects, whether or not a particular high A-Trait individual will show an elevation in A-State in a specific situation will depend upon the extent to which he perceives the situation as dangerous or threatening, and this will be greatly influenced by his aptitude and skills and by his past experience. For example, the requirement to perform on a different task may evoke high levels of A-State in most individuals with high A-Trait, but a high A-Trait person who has the requisite skills and experience to do well on a task is not likely to regard it as threatening. Conversely, a task or situation that most people would find nonthreatening might be regarded as extremely dangerous by a low A-Trait individual for whom it has special information regarding the probability that high levels of A-State will be aroused, the impact of any given situation can only be ascertained by taking actual measurements of A-State intensity in that situation.

There is some evidence that persons with high A-Trait do not perceive physical dangers as any more threatening than do low A-Trait individuals. It has been observed, for example, that while threat of electric shock produces significant increases in both self-report and physiological measures of A-State, the magnitude of increase in A-State intensity produced by shock threat is unrelated to level of A-Trait as measured by MAS (Katkin, 1965; Hodges and Spielberger, 1966).

In the Hodges-Spielberger study, *S*s were also given a "Fear of Shock Questionnaire" (FSQ) which was included among a group of tests administered two month prior to the experiment. The FSQ consisted of the single item, "How much concern or apprehension would you feel about participating in a psychology experiment in which you received electric shock?" Subjects responded by rating themselves on a five-point scale from "none" to "extreme." FSQ scores were positively and significantly correlated with changes in heart rate produced by threat of shock (r = .43), and with level of A-State intensity as measured by the AACL-Today (r = .49). In contrast, no correlations were found between the FSQ and MAS scores, nor between the FSQ and changes in heart rate. Thus, subjects who reported greater fear of shock showed greater increases in physiological and self-report measures of A-State intensity when threatened with shock than those who reported little or no fear of shock, but threat of shock failed to produce differential increases in these A-State measures for persons who differed in level of A-Trait.

A Trait-State Theory of Anxiety

The conception of anxiety presented in Figure 1 assumes that the arousal of A-State involves a process or sequence of temporally ordered

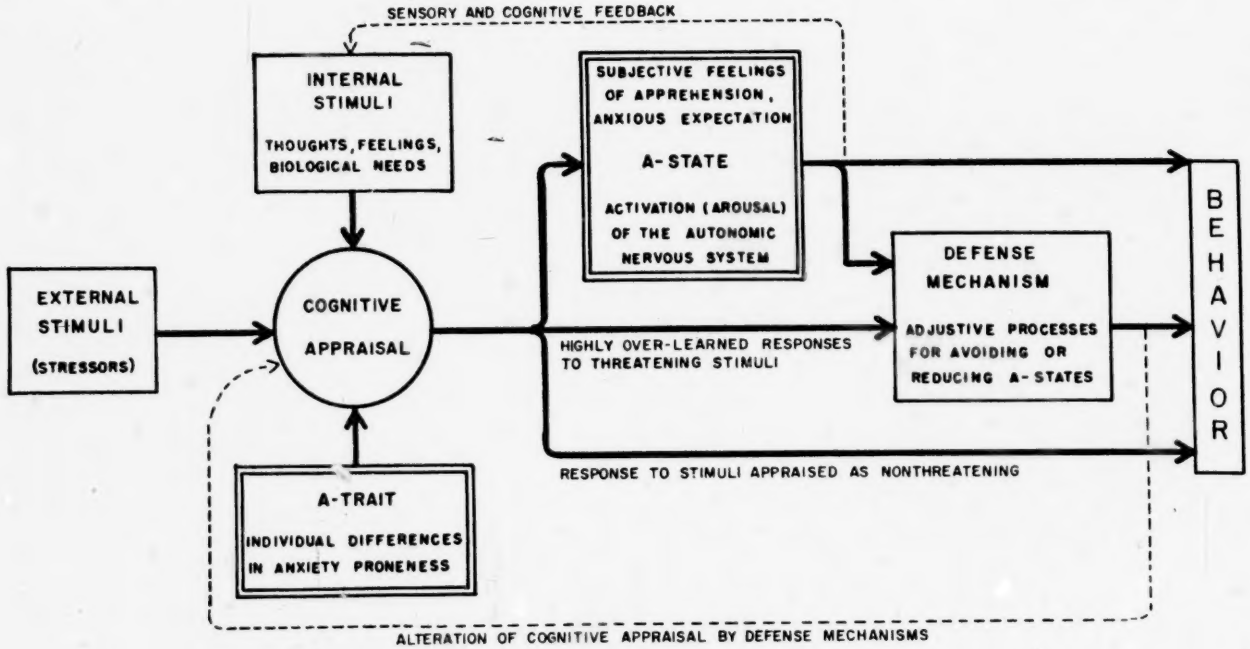

Figure 1. A Trait-State conception of anxiety in which two anxiety concepts, A-Trait and A-State, are conceptually distinguished from the stimulus conditions that evoke A-State reactions, and the defenses that serve to avoid or ameliorate them. Reprinted with permission from C. D. Spielberger, Editor, **ANXIETY AND BEHAVIOR**, p. 17, © by Academic Press, Inc.

events. This process may be initiated by an external stimulus that is appraised by an individual as dangerous, such as the imminent threat of injury or death faced by a soldier in combat. Or it may be aroused by situations that involve psychological stress, such as the threat to self-esteem that is encountered in performing on a competitive task.

Internal stimuli which cause an individual to anticipate danger may also evoke higher levels of A-State. For example, a student who suddenly recalls that he has not prepared for a test that will be administered during the next class period is likely to experience an increase in level of A-State intensity. As previously noted, situations or circumstances in which personal adequacy is evaluated are likely to be perceived as more threatening by high A-Trait individuals than by persons who are low in A-Trait. However, the appraisal of a particular stimulus or situation as threatening may be influenced more by idiosyncratic skills and past experience than by either the individual's level of A-Trait or the objective danger that is inherent in the situation.

Once a stimulus situation is appraised as threatening, Trait-State Anxiety Theory (Spielberger, Lushene, and McAdoo, in press) posits that: (1) an A-State reaction will be evoked; (2) the *intensity* of the A-State reaction will be proportional to the amount of threat the situation poses for the individual; and (3) the *duration* of the reaction will depend upon the persistence of the evoking stimuli and the individual's previous experience in dealing with similar circumstances. The theory further assumes that through sensory and cognitive feedback mechanisms high levels of A-State intensity will be experienced as unpleasant, and will serve to initiate cognitive or motoric processes that have effectively reduced A-States in the past.

Stressful situations that are encountered frequently may lead an individual to develop effective coping responses that quickly alleviate or minimize the danger, thereby reducing immediately the intensity of the A-State reaction. A person may also respond directly to situations that are appraised as threatening with defensive processes that serve to reduce the intensity of A-State reactions. Two important classes of stressor situations can be identified which appear to have different implications for the evocation of A-States in persons who differ in A-Trait:

1. Circumstances in which personal adequacy is evaluated appear to be more threatening to high A-Trait individuals than to persons with low A-Trait.
2. Situations that are characterized by physical danger are *not* interpreted as any more threatening by high A-Trait individuals than by those with low A-Trait.

Accordingly, differential elevations in A-State would be expected for

persons who differ in A-Trait *only* under circumstances that are characterized by some degree of threat to self-esteem. In situations that involve physical danger, however, no difference in A-State elevation would be expected for *S*s who differed in A-Trait unless, of course, personal adequacy was also threatened.[3]

With regard to the etiology of individual differences in A-Trait, it is assumed that residues of past experience dispose high A-Trait persons to appraise situations which involve some kind of personal evaluation as more threatening than do individuals who are low in A-Trait. We may speculate that childhood experiences influence the development of individual differences in A-Trait and that parent-child relationships centering around punishment are especially important in this regard. The fact that self-depreciating attitudes are aroused in high A-Trait persons under circumstances characterized by failure or ego-involving instructions suggests that excessive criticism and negative appraisals from parents may have undermined the self-confidence and adversely influenced the self-concept of these individuals.

In summary, the schematic diagram that is presented in Figure 1 provides a cross sectional analysis of anxiety phenomena. In this trait-state conception of anxiety, two different anxiety constructs, A-State and A-Trait, are posited and distinguished from the stimulus conditions that evoke A-States and the defenses that help individuals to avoid or reduce them. Thus, Figure 1 provides a conceptual frame of reference for classifying the major variables that should be considered in research on anxiety phenomena, and suggests some of the possible interrelationships among them. The classes of variables that we believe to be most significant in anxiety research are: (a) the characteristics of stimuli, both external and internal, that evoke A-States; (b) the nature of the cognitive processes that are involved in appraising various stimuli as dangerous or threatening; and (c) the defense mechanisms that are employed to avoid A-States, or to reduce the intensity of these states once they are experienced.

The State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (Spielberger and Gorsuch, 1966; Speilberger, Gorsuch and Lushene, 1969) was developed to provide reliable, relatively brief, self-report measures of both state and trait anxiety.

[3]In many psychological experiments, threats of physical harm are confounded with threats to self-esteem. A subject may be told, for example, that he will receive an electric shock if he does poorly on a task, or if his performance falls below a certain standard.

Four important characteristics determined the test construction strategy for the STAI:

1. When the scale was given with instructions that required the subject to report his typical anxiety level ("Indicate how you *generally* feel"), *each individual item* was expected to correlate with other anxiety scales that were widely accepted as measures of individual differences in A-Trait, e.g., the Taylor Manifest Anxiety Scale and the IPAT Anxiety Scale. Each individual A-Trait item was also expected to be impervious to situational factors and relatively stable over time.
2. When the scale was given with instructions that required the subject to report his present feelings ("Indicate how you feel *right now*"), each item was expected to reflect level of A-State intensity at that particular moment in time. Therefore, items were retained for the final scale only if they showed higher means in *a priori* stressful situations than in nonstressful or nonthreatening situations.
3. A third characteristic that was sought in the STAI was high reliability in the measurement of both A-Trait and A-State, but particularly for the latter.[4] In evaluating the effects of various stressor conditions on level of A-State, the major interest is most often in the differences obtained on two or more occasions of measurement. Difference scores between any two occasions contain the error components of both the initial and final scores. Therefore, if the components of the difference score are only moderately reliable, the resulting difference score will itself be low in reliability, and thus insensitive to changes in A-State.
4. To maximize its usefulness in psychological research, a fourth characteristic that was desired in the STAI A-State scale was ease and brevity of administration. In the investigation of the effects of emotional states on performance, a long involved test would be unsuitable for many experimental tasks in which taking the test might interfere with

[4]Since level of A-State should reflect transitory conditions that exist at the time of testing, the test-retest reliability of A-State measures would be expected to be relatively low. Consistent with this expectation, test-retest correlations for college students retested on the STAI A-State scale after periods of one hour, 20 days, and 104 days ranged from .16 to .54, with a median r of only .32. In contrast, the alpha reliability of the STAI A-State scale for college students varies between .80 and .93. Given the transitory nature of personality states, measures of internal consistency such as alpha would seem to provide a more meaningful index of reliability than test-retest correlations.

performance on the task. Furthermore, a long test would be less sensitive to rapid fluctuation in the A-State.

The A-State scale that was developed on the basis of these criteria consists of 20 statements that ask people to describe how they feel at a particular moment in time; subjects respond to each scale item (e.g., "I feel tense") by rating themselves on the following four-point scale: (1) "Not at all; (2) Somewhat; (3) Moderately so; (4) Very much so." The A-Trait scale consists of 20 statements that ask people to describe how they generally feel; subjects respond to each scale item (e.g., "I lack self confidence") by checking one of the following: (1) Almost never; (2) Sometimes; (3) Often; (4) Almost always. The State-Trait Anxiety Inventory is comprised of these two self-report scales. Item selection procedures and the item validation process for the STAI are described in detail by Spielberger and Gorsuch (1966) and by Spielberger, Gorsuch and Lushene (1969a).

The STAI A-State scale evaluates subjective feelings of tension, nervousness, worry and apprehension. In developing this scale, it was discovered that such feelings were highly correlated with the absence of feelings of calmness, security, contentedness and the like. Therefore, items such as "I feel calm" and "I feel content" were included to produce a balanced A-State scale: half of the items pertain to the presence of feeling of apprehension, worry or tension, and the remaining items reflect the absence of such states. Thus, the STAI A-State scale defines a continuum of increasing levels of A-State intensity, with low scores indicating states of calmness and serenity, intermediate scores indicating moderate levels of tension and apprehensiveness, and high scores reflecting states of intense apprehension and fearfulness that approach panic.

It has been demonstrated that scores on the STAI A-State scale increase in response to various kind of stress and decrease as result of relaxation training (Spielberger, et al., 1969). Further evidence bearing on the construct validity of the STAI A-State scale may be found in recent studies by Hodges (1967) and Taylor, Wheeler, and Altman (1968), and in the experiments that are reported in Section IV below. The relationship between anxiety and learning is considered in the next section.

III. Anxiety and Learning

Over the past two decades, much of the research on the effects of individual differences in anxiety on the learning process has been guided by a theory of emotionally-based drive formulated by Spence (1958)

and Taylor (1956). A detailed statement of the current status and empirical evidence supporting the Drive Theory was recently published by Spence and Spence (1966). The theory proceeds from Hull's (1943) basic assumption that excitatory potential, *E*, which determines the strength of a given response, *R*, is a multiplicative function of total effective drive state, *D*, and habit strength, *H*. Thus:

$$R = f(E) = f(D \times H)$$

Total effective drive state, *D*, results from the summation of all individual need states existent in a person at a given period in time, irrespective of their source. The number and strength of the specific habits that are elicited in any situation is determined by an individual's previous experience in the same, or in similar situations. All habit tendencies that are evoked in a subject by a particular situation are multiplied by *D*. Predictions from Hullian theory regarding the effects of variations in *D* on performance have been succinctly stated by Taylor:[5]

> The implication of varying drive level in any situation in which a single habit is evoked is clear: the higher the drive, the greater the value of *E* and hence of response strength. Thus in simple noncompetitional experimental arrangements involving only a single habit tendency the performance level of high drive *S*s should be greater than that for low-drive groups. Higher drive levels should not, however, always lead to superior performance (i.e., greater probability of the appearance of the correct response). In situations in which a number of competing response tendencies are evoked, only one of which is correct, the relative performance of high and low drive groups will depend upon the number and comparative strengths of the various response tendencies. (Taylor, 1956, p. 304).

Drive Theory proper begins with the assumptions that noxious or aversive stimuli arouse a hypothetical emotional response, r_e. The Taylor (1953) Manifest Anxiety Scale (MAS) was developed as an operational measure of individual differences in r_e. It was originally assumed that scores on the MAS were positively related to characteristic differences among people in r_e and, therefore, reflected consistent individual

[5]Taylor also notes that in tasks involving a number of competing response tendencies predictions concerning the performance of HA and LA subjects may require consideration of the Hullian concepts of oscillatory inhibition (O) and response threshold (L). While these concepts have been occasionally called upon to account for experimental findings in tests of Drive Theory utilizing complex learning tasks, such explanations have generally been post hoc. Since neither O nor L have been given operational meaning in investigations of human learning guided by Drive Theory, these concepts will not be further considered here.

differences in *D*. The construct validity of the MAS as an index of *D* has been repeatedly demonstrated in classical conditioning experiments in which the UCS is typically a noxious stimulus (Spence, 1964).

But verbal learning and concept attainment tasks do not generally involve noxious stimulation, at least in a physical sense. Evidence bearing on whether persons with high anxiety (HA) as measured by the MAS have higher *D* than low anxiety (LA) subjects when performing on such tasks is inconclusive. This led Spence to propose two alternative hypotheses concerning the relation between MAS scores and *D*: (a) The "Chronic Hypothesis" posits that HA *S*s are more emotional than LA *S*s and this causes them to manifest higher *D* in *all* situations, whether stressful or not. (b) The "Reactive Hypothesis" posits that HA *S*s are more emotionally responsive than LA *S*s which causes them to react with higher *D* to situations involving some form of stress.

Investigations of learning under neutral and stressful experimental conditions provide strong empirical support for the Reactive Hypothesis (e.g., Nicholson, 1958; Sarason, 1960; Spence and Spence, 1966; Spielberger and Smith, 1966). In these studies, differences in the performance of *S*s who differed in anxiety as measured by the MAS were obtained only when the experimental conditions involved some form of psychological stress. The kinds of psychological stress that were especially effective in producing performance differences which could be attributed to drive level were ego-involving instructions (e.g., *S*s were told they were performing on an intelligence test) and failure instructions (e.g., *S*s were told they were doing poorly on an experimental task).

Spence's Reactive Hypothesis may be interpreted in terms of Trait-State Anxiety Theory if it is assumed that individuals who are high in A-Trait, as measured by instruments such as the MAS, the IPAT Anxiety Scale, or the STAI A-Trait scale, tend to perceive situations that involve psychological stress as more threatening than do low A-Trait individuals. On the further assumption that A-State and drive level (*D*) are positively related, high A-Trait individuals would be expected to have higher *D* only in situations involving psychological stress.

According to Drive Theory, the effects on performance in a learning task of individual differences in *D* depend upon the relative strengths of the correct and competing response tendencies that are evoked in the task. On simple tasks, in which there is a single dominant response tendency, or in which correct response tendencies are stronger than competing responses, it would be expected that high *D* associated with high levels of A-State intensity would facilitate performance. On complex or difficult tasks, in which competing error tendencies were numerous and/or stronger than correct response tendencies, high *D* associated

with high A-State intensity would be expected to interfere with performance. These predictions are tested in the experiments on computer assisted learning reported in the next section.

IV. Effects of Anxiety on Computer-Assisted Learning

Most studies concerning the effects of anxiety on learning have originated either in artificial laboratory settings or realistic but poorly controlled natural settings. Computer-Assisted Instruction (CAI) systems provide a convenient natural setting in which it is possible to evaluate the learning process under carefully controlled conditions with materials that are relevant to the real-life needs of the subject. In the studies reported below, the effects of anxiety on the learning process were investigated in a CAI setting.

Study I: The Effects of A-State on Computer-Assisted Learning

This study investigated the relationship between A-State and performance for college students who learned difficult and easy mathematics concepts by computer-assisted instruction (O'Neil, Spielberger, and Hansen, 1969). According to Spence-Taylor Drive Theory, it would be expected that the performance of high A-State students would be inferior to that of low A-State students on tasks in which competing error tendencies were stronger than correct responses, and superior on tasks in which correct responses were dominant relative to incorrect response tendencies. With regard to the expected relationship between A-State and performance in the present study, it was hypothesized that students who were high in A-State would make more errors than low A-State students on the difficult CAI task, and that this relationship would be reversed on the easy task. A unique feature of this study was that A-State measures were obtained while the students performed on the learning tasks.

The subjects (*Ss*) were undergraduate students enrolled in the introductory psychology course at Florida State University. The A-State scale of the STAI (Spielberger, *et al.*, 1969) provided a self-report measure of the phenomenological aspects of A-State. Measures of systolic blood pressure (SBP) were obtained as indicants of the physiological component of A-State. SBP was measured by means of a desk model Baumanometer. A CAI typewriter terminal controlled by an IBM 1440 System (IBM, 1965) presented the learning mater[illegible]nd recorded the students' responses. The CAI program was wri[illegible]linear format using COURSEWRITER I (IBM, 1965), an author[illegible]mer language. The CAI program was composed of two main par[illegible]a Difficult Section,

which required *S*s to prove the mathematical field properties of complex numbers, and an Easy Section, which consisted of problems about compound fractions. The programming logic required the *S* to solve each succeeding problem correctly before he could attempt the next one. The learning materials are described in detail by O'Neil, Spielberger and Hansen (1969).

Two experimenters (*E*s) supervised as many as eight *S*s at the same time. The *S*s were seated at CAI terminals located in a sound-deadened, air-conditioned room, which the *E*s entered only to read instructions, administer the anxiety scales and take blood pressure. The experimental procedures were the same for all students and were divided into four main periods: Pre-task, the Difficult and Easy Performance Periods, and Post-tasks. During the performance periods, each *S* first progressed through the difficult learning materials and then the easy materials. At the end of each period SBP was taken and the STAI A-State scale was administered. The possibility of systematic experimenter bias was minimized by insuring that neither *E* took a complete series of A-State measures for any single S. A brief four-item A-State scale was also presented during the task by the computer, and *S*s were instructed to respond to it according to how they felt while working on the task.

Results: The mean STAI A-State scores for the Pre-task Period, the two performance periods, and the Post-task period are presented in Figure 2. It may be noted that A-State scores increased from the Pre-task period to the Difficult task period, decreased in the Easy task period, and showed no change from the Easy task period to the Post task period. In a two-factor analysis of variance with repeated measures, only the Periods main effect was statistically significant. Individual *t* tests revealed that A-State scores were significantly higher in the Difficult task period than in any of the other periods. There were no differences in the A-State scores of men and women.

The mean SBP values, corresponding to the periods for which STAI A-State measures were available, are presented in Figure 3. It may be noted that SBP increased during the Difficult task period, decreased during the Easy task period and showed little change from the Easy task period to the Post-task period. In the analysis of variance for these data, the main effects for Sex and Periods were statistically significant, indicating that: (a) SBP for males was considerably higher than for females; and (b) SBP showed changes over task periods similar to those obtained for the STAI A-State scores. For both men and women, SBP measures taken immediately after *S*s performed on the Difficult task were significantly higher than in any other period.

In the analysis of the error data for the Difficult and the Easy CAI tasks, each task was divided into two sections. For the Difficult task,

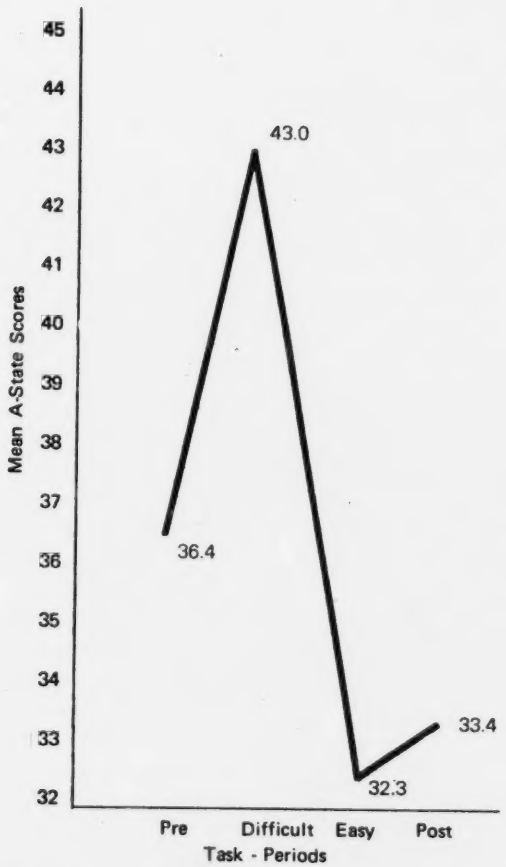

Figure 2. Mean STAI A-State scores obtained by students in the Pre-task and Post-task periods, and while they worked on the Difficult and Easy CAI learning tasks.

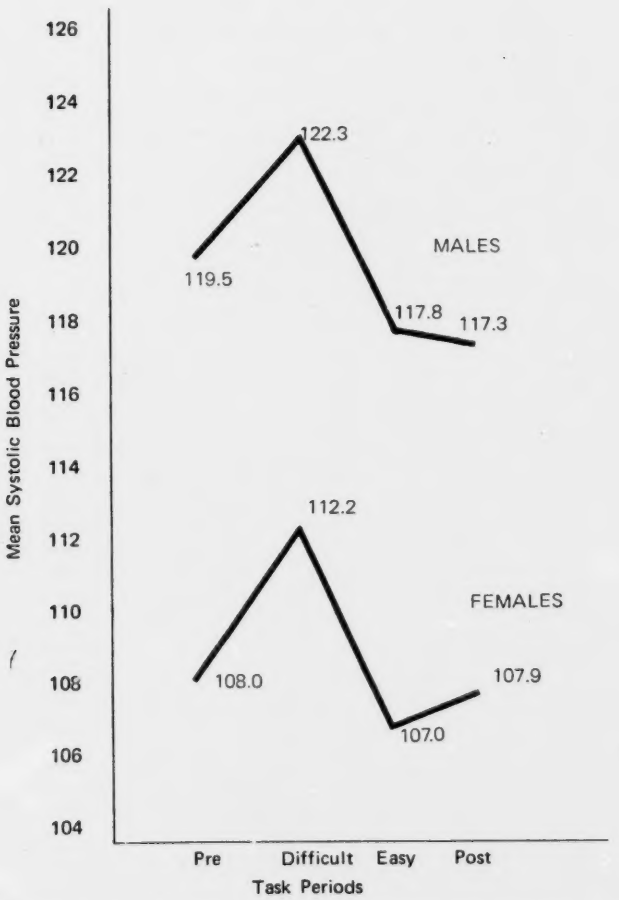

Figure 3. Mean systolic blood pressure obtained for males and females during the Pre-task and Post-task periods and while students worked on the Difficult and Easy CAI learning tasks.

the first section consisted of five proof statements, Diff/(1-5), and the second section consisted of the remaining twelve proof statements, Diff/(6-17). Similarly, for the Easy task, the two sections corresponded to the first five items, Easy/(1-5), and the remaining eleven items, Easy/(6-16). Brief A-State scales had been given by the computer between the two sections of each task.

The mean number of errors per problem for the first and second sections of the Difficult and Easy tasks are presented in Figure 4. It may be noted that the Diff/(1-5) section produced the most errors, the Diff/(6-17) section produced an intermediate number of errors, and that errors fell almost to zero in both sections of the Easy task. These data were evaluated in an analysis of variance in which the significant F ratio for tasks indicated that errors declined across the four periods. There were no differences in mean number of errors for men and women.

No significant sex differences were found for either STAI A-State scores or errors. Therefore, in the evaluation of the relationship between A-State and errors, the data for men and women were combined. But separate analyses were carried out for the Difficult and Easy tasks because there were significant differences between them in mean number of errors. For these analyses, the *S*s were divided at the median STAI A-State score obtained during each task. Subjects whose scores were above the median were designated the High A-State group; those below the median were designated the Low A-State group.

The number of errors made by the High and Low A-State groups on the two sections of the Difficult Task is indicated in Figure 5. High A-State *S*s made nearly twice as many errors as the low A-State *S*s on the Diff/(1-5) section, and they made fewer errors than low A-State *S*s on the Diff/(6-17) section. An analysis of variance for these data yielded a significant A-State by Tasks interaction and a main effect of Tasks. There were very few errors on the Easy task and no statistically significant F ratios were obtained in the analysis of the error data for this task.

To sum up, state anxiety increased when *S*s worked on difficult CAI materials. This pattern of change in A-State was observed for the 20-item STAI A-State scales, for the brief A-State scales embedded in the learning materials, and for the SBP measures. While there were no differences in the STAI A-State scores for men and women, the SBP scores for males were significantly higher for males than for females. It is known that SBP is dependent upon physical characteristics such as height, weight and body build (Gregg, 1961). Since the males, on the average, were taller, heavier and more muscular than females, higher levels of SBP would be expected on the basis of these physical differences.

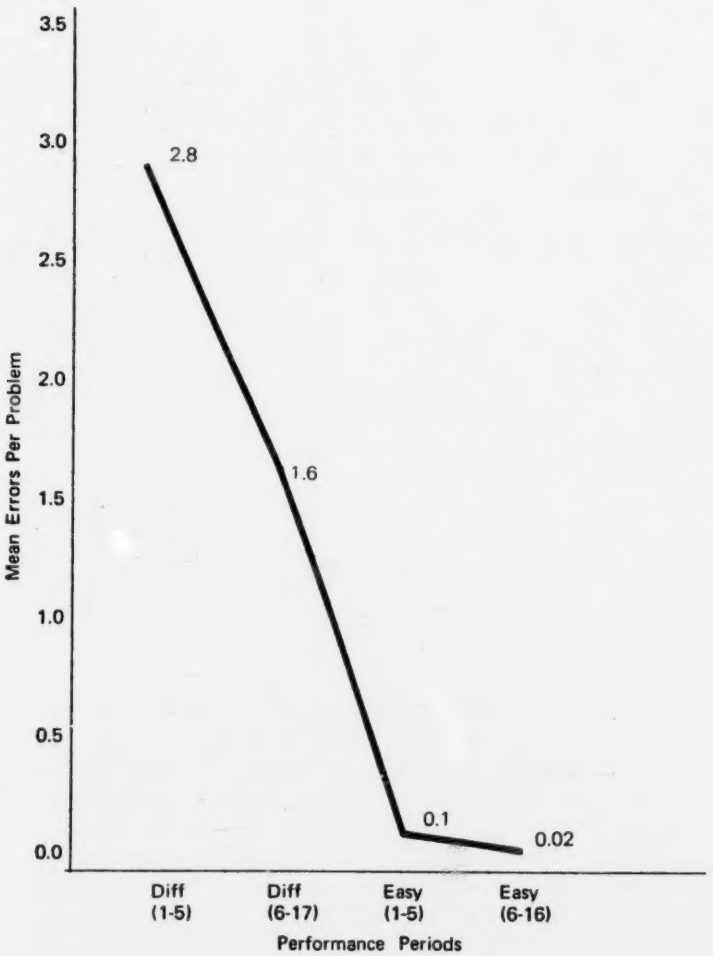

Figure 4. Mean number of errors per problem for the two sections of the Difficult and Easy CAI learning tasks.

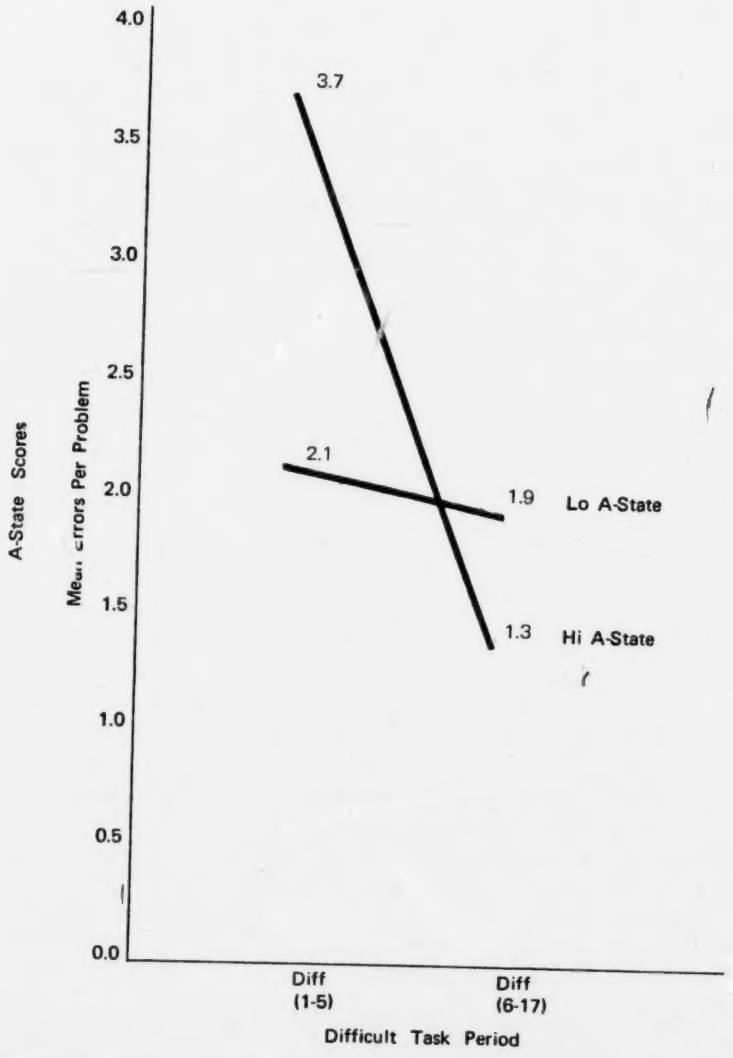

Figure 5. Mean number of errors per problem made by students with high and low A-State scores on the two sections of the Difficult CAI task.

In Figure 5, it may be noted that the high A-State students made more errors than the low A-State students on Diff/(1-5) whereas low A-State students made more errors than high A-State students on Diff/(6-17). On the assumption that A-State reflects drive level (*D*), the finding that performance on the CAI task was an interactive function of level of A-State and Task Difficulty is consistent with the prediction from Drive Theory that the effects of anxiety on learning will depend upon the relative strength of correct responses and competing error tendencies (Spence and Spence, 1966). In the present study, A-State apparently influenced performance by: (a) activating error tendencies on the initial section of the Difficult CAI task, for which error rate was relatively high; and (b) enhancing the production of correct responses on the second section of the Difficult task, for which error rate was relatively low.

In contrast to the interactive relationship obtained between A-State and errors on the Difficult CAI task, no relationship was found between A-Trait and errors in this study. It should be noted, however, that in the statistical analysis of error rate as a function of A-Trait *S*s were divided at the median of the A-Trait score distribution, rather than selected on the basis of extreme A-Trait scores as is customary in research on anxiety and learning. Thus, for high and low A-Trait students, the differences in A-State (and the corresponding difference in *D*) may not have been large enough to produce the expected differences in performance.

Study II: State and Trait Anxiety and Computer Assisted Learning

In this study,[6] subjects were selected on the basis of extreme scores on the STAI A-Trait scale and the order of presentation of the Difficult and Easy CAI tasks was counter balanced. In addition, an IBM 1500 CAI system was employed which made it possible to evaluate the generality of the findings obtained in Study I with an IBM 1440 system. It was hypothesized that high A-Trait (HA) students would respond to the CAI tasks with higher levels of A-State than low A-Trait (LA) students, and that students who responded to the learning tasks with high A-State would make more errors on the more difficult CAI materials and fewer errors on the easy CAI materials than low A-State stude.

The A-State and A-Trait Scales of the STAI (Spielberge., et al., 1969) were administered to approximately 1100 introductory psychology students. From this population, 80 males whose scores were in the upper

[6]Study II is described in greater detail in an unpublished paper presented in February, 1969, by O'Neil, Hansen and Spielberger at the American Educational Research Association Meetings in Los Angeles.

and lower twenty per cent of the A-Trait distribution for the class were invited to participate in an experiment on computer assisted learning. Of the 44 *S*s who were selected from this group, 22 had high A-Trait scores and 22 had low A-Trait scores; these *S*s were respectively designated the HA and LA groups. The CAI mathematics program used in the previous study (O'Neil, *et al.*, 1969) was adapted for the present experiment by recoding the same learning materials in Coursewriter II (IBM, 1967).

The learning materials were presented by an IBM 1500 CAI System (IBM, 1967). The terminals of this system consist of a cathode-ray tube, a light pen, and a keyboard. For each problem, the *S* selected the response he believed to be correct from multiple choices presented on the screen of the cathode-ray tube. He did this by pressing the light pen against a box that corresponded to the answer he considered correct. If the response was correct, the next problem was immediately presented; if the response was incorrect, the same problem was presented again. Since the display on the screen of the cathode-ray tube was removed after each response, information from previous responses was not available to the subject. Thus, there was a greater memory load with the IBM 1500 system used in Study II than with the CAI typewriter terminal used with the 1440 system in Study I, and this produced a larger number of errors.

The CAI system also presented the STAI A-State scales during the learning tasks and recorded the student's responses. Seven measures of A-State were obtained. Except for the pre-task A-State scale, which was given with standard instructions ("indicate how you feel right now"), *S*s were asked to respond to the A-State scales by indicating how they felt while performing on each preceding section of the learning task. The administrations of the A-State scales were programmed so that the order of item presentation on different occasions was random.

The experimental procedures in Study II were divided into three periods: (a) the Pre-task period, in which the students learned how to operate the CAI terminals; (b) the Performance period in which the computer presented the learning materials; and (c) the Post-task period in which students were interviewed and debriefed. These procedures were essentially the same as in Study I, except that blood pressure was not taken and the Easy and Difficult CAI tasks were presented in counterbalanced order. Each subject was assigned either to the D/E order, in which he progressed through the Difficult task first and then the Easy task, or the E/D order in which the Easy task was followed by the Difficult task.

Results: The mean STAI A-State scores for HA and LA *S*s on each of the three sections of the Difficult and Easy tasks are shown in Figure 6. The data as presented have been collapsed over task order since level of

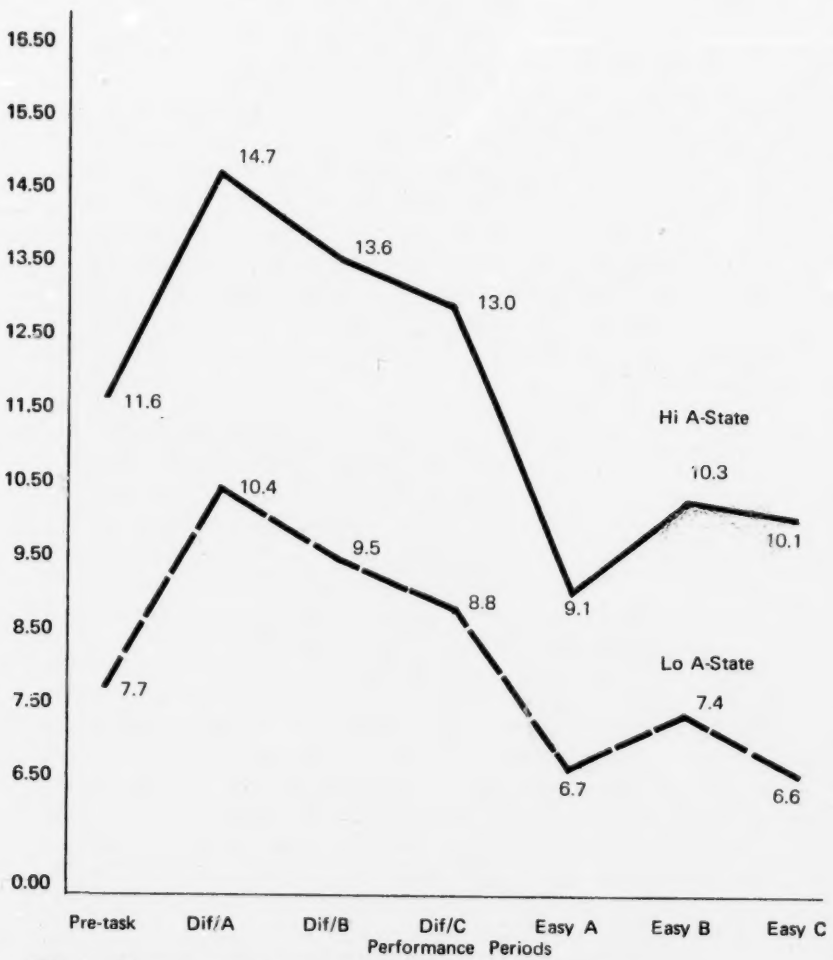

Figure 6. Mean STAI A-State scores obtained by students in the Pre-task period and while they performed on each of the three sections of the Difficult and Easy CAI learning tasks.

A-State was approximately the same during the Difficult task irrespective of whether it was given first or preceded by the Easy task, and A-State intensity in the Easy task was approximately the same when it was given either first or second. It may be noted in Figure 6 that: (a) HA *S*s responded with higher levels of A-State than the LA *S*s throughout the experiment; and (b) Level of A-State intensity increased from the Pre-task measure to Diff/A, decreased somewhat during Diff/B and Diff/C, and was relatively low in all three sections of the Easy task.

Although there was a greater difference in A-State for the HA and LA *S*s in the Difficult task than in the Easy task, the *F* ratio for the A-Trait by Task Difficulty interaction was not statistically significant. The main effects of A-Trait and Periods were significant, however, and further analysis of the Periods effect indicated that A-State was significantly higher in the Difficult CAI task than in the Easy task. Thus, A-State scores varied as a function of both A-Trait and task difficulty, but not as a function of task order, and higher levels of A-State were associated with the more difficult task.

Since there were so few errors on the Easy CAI task, the relationship between A-State and errors was investigated only for the three sections of the Difficult task. In this analysis, the students were divided at the STAI A-State median obtained during Diff/A, which was 13. The mean number of errors per problem made by high and low A-State students on the three sections of the difficult task are presented in Figure 7A. It may be noted that high A-State students made more than twice as many errors on Diff/A than low A-State students, whereas there was relatively little difference in the error rate for high and low A-State students on Diff/B and Diff/C.

The analysis of variance for these data yielded a significant A-State by Periods interaction similar to that obtained for these same variables in Study I. The data for Study I, in which Diff/B and Diff/C were combined, are shown in Figure 7B. In both studies, high A-State *S*s made many more errors on the CAI materials presented earlier in the task than on the materials presented later in the task. In contrast, there was relatively little difference in the error rate for low A-State *S*s on materials presented earlier and later in the learning task. A comparison of the results presented in Figures 7A and 7B also reveals that the same learning materials produced more errors when presented with the IBM 1500 CAI system than with the IBM 1440 system that presented the learning materials in Study I.

Although high A-Trait students in Study II had higher A-State scores throughout the experiment, no relationship was found between A-Trait and errors. This was unexpected because A-State scores and errors were related, and A-Trait scores were moderately correlated with A-State. In

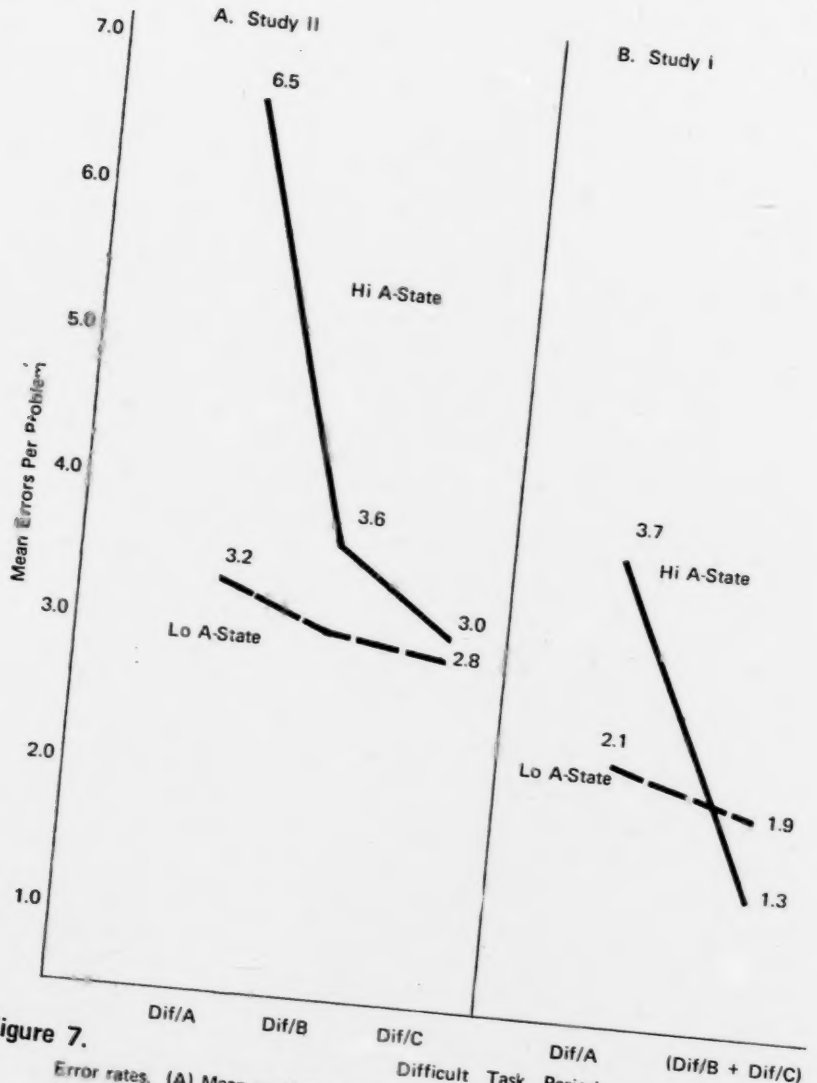

Figure 7. Error rates. (A) Mean number of errors per problem in Study II on each of the three sections of the Difficult CAI learning task for students who obtained high and low STAI A-State scores during the first section of this task. (B) Mean number of errors per problem in Study I on the Difficult CAI learning task for students who obtained high and low STAI A-State scores on the first section of this task.

order to clarify the relationship between A-Trait and errors, the simultaneous influence of A-Trait and A-State on performance was evaluated. For this analysis, the HA and LA groups were divided into high and low A-State sub-groups on the basis of whether a student's score was above or below the A-State median obtained in Diff/A. Approximately 25% of the high A-Trait students had low A-State scores during Diff/A and a comparable percentage of low A-Trait students had high A-State scores.

The error data for HA and LA students whose A-State scores were consistent with their A-Trait scores are presented in Figure 8A; the data for the HA and LA students whose A-State scores were inconsistent with their A-Trait scores are presented in Figure 8B. It may be noted that the data in Figure 8A are generally quite consistent with the findings in the previous experiment (See Figure 7B); the HA/high A-State students made more errors on materials presented at the beginning of the CAI task and fewer errors on materials presented later in the task than did LA/low A-State students. Thus, when A-State level was consistent with A-Trait scores, the familiar A-Trait by task difficulty interaction was noted.

Perhaps the most interesting findings in Study II are the error rates presented in Figure 8B for students whose A-State scores were inconsistent with their A-Trait scores. The error rate for LA students with high A-State scores was over four times as great as the error rate for the HA/low A-State students on Diff/A, and remained high on Diff/B and Diff/C. In contrast, the HA/low A-State *S*s made fewer errors than any other group.

In an effort to clarify the data presented in Figure 8B, measures of intellectual aptitude were obtained from university records. For those students who participated in Study II for whom aptitude scores were available, the median CEEB SAT (College Board) score for the LA/high A-State students was just over 800, in contrast to median SAT scores of 1050 to 1100 for students in the other three groups. Thus, the low A-Trait students who experienced high levels of A-State intensity while performing on the difficult CAI task were much lower in intellectual ability than their peers.

To sum up, in the computer-assisted learning studies supported in this paper, higher levels of state anxiety were observed for students who worked on difficult CAI mathematics materials whereas level of A-State intensity for these same students was relatively low while they worked on easy materials. On the more difficult materials, overall error rate was high and students with high A-State scores showed impaired performance relative to low A-State students. In contrast, high A-State students made fewer errors than low A-State students on CAI materials for which there was a relatively low overall error rate. Thus, task difficulty

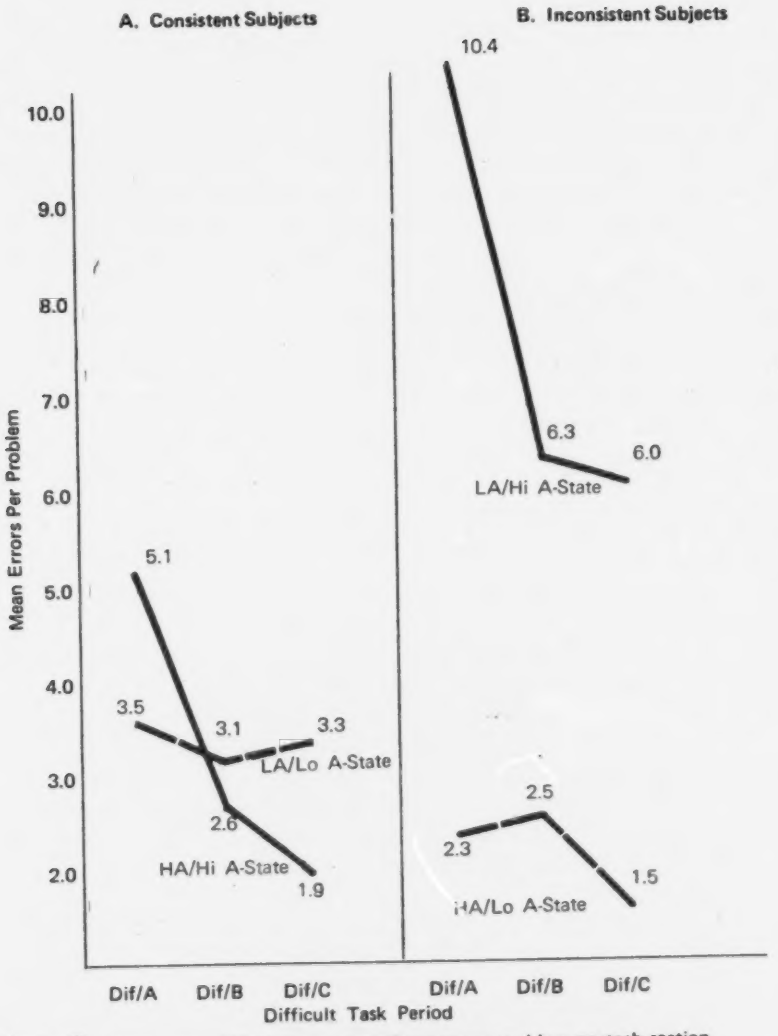

Figure 8. Error rates. (A) Mean number of errors per problem on each section of the Difficult CAI learning task for students whose STAI A-State scores on this task were consistent with their A-Trait scores. (B) Mean number of errors per problem on each section of the Difficult CAI learning task for students whose STAI A-State scores on the first section of this task were inconsistent with their A-Trait scores.

influenced level of A-State intensity, and individual differences in A-State either impaired or facilitated performance, depending upon the overall error rate produced by the task. In general, these findings are consistent with Spence-Taylor Drive Theory and Trait-State Anxiety Theory (Spielberger, Lushene and McAdoo, in press).

Although STAI A-Trait scores were relatively good predictors of level of A-State intensity, individual differences in A-Trait were unrelated to performance. For students whose A-Trait and A-State scores were consistent, however, high A-State was associated with poorer performance on the more difficult part of the CAI learning task, and with better performance on the easier CAI learning materials. For students whose A-Trait and A-State scores were inconsistent, high levels of A-State intensity were especially detrimental to the performance of the LA/high A-State students, as may be noted in Figure 8B. These students have infrequently experienced anxiety states in the past and we may speculate that they have not learned to cope effectively with such states when they occur. In contrast, the HA/high A-State students made more errors on the first section of the difficult task, but the performance of these students was ultimately superior to that of LA students. This finding suggests that HA students have had more experience than LA students in adjusting to anxiety states in the past and are therefore better able to cope with such states when they occur.

V. Implications of Research on Anxiety and Learning for the Classroom Teacher

What implications do the research findings on anxiety and learning have for the classroom teacher? To begin with, it is important for teachers to recognize that students respond emotionally to learning situations and that emotional reactions may either facilitate or impair performance (Spielberger, 1966b). Emotional reactions such as anxiety are likely to be more intense for difficult learning tasks than for easy tasks, particularly where there is an evaluation of the student's performance which may have some bearing in his future success. Since the evaluation of achievement is an essential activity in most educational settings, it would seem important for teachers to understand the nature of anxiety and how it influences learning and behavior.

Because anxiety is an unpleasant emotional state that often interferes with constructive behavior, some educators contend that there is no place for anxiety in the classroom. It is true that high levels of A-State may impair performance, particularly at the beginning of a difficult learning task, as was the case in our studies of computer-assisted instruction. However, a moderate amount of A-State may actually facilitate

learning by helping a student to be more alert, and motivating him to try harder and persist in his efforts. In working with children in the classroom, teachers can help students to recognize that it is normal to be concerned about how well one will do on a difficult task. It is especially important for the teacher to be available to students as they begin to work on a new learning task because fear of failure and anxiety (A-State) reactions are likely to be greatest at such times.

It is essential for the classroom teacher to realize that the emotional reactions of all students to a given learning task will not be the same. Anxiety reactions will depend upon the amount of personal threat that a specific task poses for a particular student. Because of fear of failure, some students (those with high A-Trait) react to most learning situations as personally threatening. But whether or not a specific learning task or classroom setting will be regarded as threatening by a particular child will be determined by a host of factors. Among the most important are individual differences in intelligence, aptitude, or learning ability, and past experience in similar circumstances. The personality characteristics of the teacher may also be a critical factor for certain children, particularly those who are introverted, shy and highly dependent upon adults for guidance and direction.

Knowledge of the role of individual differences in learning will assist teachers to be more sensitive to the needs of individual students. Students who are high in anxiety proneness (A-Trait) will need more help at the beginning of a difficult learning task, but may do quite well after they have attained a degree of mastery of the task. While students with low A-Trait may have less difficulty at the beginning of a learning task because they experience less intense levels of A-State, a low A-Trait student who lacks the ability to do well on the task may be overwhelmed with anxiety if it is important for him to succeed. However, once a low A-Trait student has achieved a certain degree of mastery of a task, he may require continual challenge in order not to lose interest in his work.

It is particularly important for teachers to be aware of the abilities and the limitations of their students. When a child works on a difficult learning task for which he has little aptitude, the failure he experiences is likely to induce high levels of state anxiety which will interfere with his efforts to master the task. Paradoxically, the student who is *not* highly disposed to experience anxiety will have the greatest difficulty in situations that are perceived by him as threatening. Since he has less experience in coping with anxiety, he is more likely to find it extremely unpleasant and disruptive when it occurs.

While it is not possible to avoid anxiety in the classroom, anxiety need not be detrimental to learning. The relationship between anxiety

and learning is exceedingly complex, and a great deal of research will be required in order to ascertain how best to help students cope more effectively with anxiety. This knowledge can be more readily obtained if psychologists and educational researchers collaborate with classroom teachers in seeking it.

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Belief Systems and Education: Some Implications for Change

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The goals of education, their means of attainment and the criteria by which both ends and means can be evaluated depend almost exclusively upon resolution of the question: "Education for what?" Answers to this question, historically and currently, are as varied as the breadth and specificity of the ideological commitments and values of the respondents. Yet one recurrent goal which seems to encompass many of the espoused educational objectives and to provide a great deal of consistency among them is that of equipping the student with the necessary skills to live effectively and productively in the world of tomorrow. Disagreement is widespread and intense, however, both as to what these necessary skills are and the ways and conditions by which they may be developed and imparted.

An attempt to specify the requisite skills for coping with the future might appear futile or even meaningless since tomorrow is unknown, even unknowable, and thus is likely to present conditions which are uninterpretable from our present modes of construal and to present problems insoluble by our present habits and techniques of solution. Yet these very conditions of uncertainty yield a wealth of information both as to the kinds of skills that are required to cope with the unknown and

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the kinds of practices and approaches that are irrelevant to and incompatible with solution of the unforeseen.

Effective coping with the new and the unexpected precludes fixity and demands, among other skills, the ability to withstand uncertainty and stress, to behave flexibly, to be committed with openness, to avoid over-generalization and to base decisions on empirically derived information instead of certitude based on opinionation. Our work has made it clear that individuals whose belief systems may be characterized as being more *abstract* are far more likely to possess such skills than persons whose belief systems are more *concrete*. Thus education, as one of its major goals, should push toward the discovery and establishment of conditions that foster the development of the student into an abstractly instead of a concretely functioning individual (Harvey, Hunt and Schroder, 1961).

Following a depiction of the general nature and function of belief systems, and how they serve as different systems of motivation, I shall present some of the evidence on how belief systems differentially influence the way situations are interpreted and responded to, examine some of their developmental determinants and suggest some implications for education, especially for the problem of how belief systems may be changed through educational processes and the student be induced to function at the higher levels of abstractness.

Nature and Function of Belief Systems

A belief system represents a set of predispositions to perceive, feel toward and respond to ego-involving stimuli and events in a consistent way. As such, it operates as a kind of psychological filter which renders the individual selective in his discriminations, in what he attends to, in what he admits into and keeps out of his system, in what generates positive and negative affect within him and in the ways he responds toward certain bands or family of stimuli. Especially relevant for education, the person's belief systems additionally influence the kinds of cues or guideposts on which one relies and utilizes in making his decisions. Hence one person, for example, may depend upon cues and symbols implying status and authority while another may rely more on information presented than on perceived attributes of the one making the presentation.

The stress on ego-involvement should be noted. On the basis of considerable evidence we have come to assume that the different belief systems produce *different effects only in relation to highly involving stimuli and that their effects are therefore minimal on stimuli that are affectively neutral* (Harvey, 1967; Harvey & Felknor, 1968). This

assumption is consistent with, perhaps even dependent upon, a second basic assumption which has to do with the acquisition of highly involving concepts or beliefs: *namely, that representatives of the more concrete belief systems acquire their more central beliefs through a process of conditioning while representatives of more abstract systems acquire their more involving beliefs as products of inductive and insightful learning.* This is meant to that, as conditioned responses, the functioning of the affectively laden concepts of the concrete person is more under control of the autonomic system while the conceptual functioning of the abstract individual, even when affective concepts are engaged, is more under control of cerebral processes. The differential influence of the autonomic and cerebral processes on concrete and abstract persons is assumed to be the result of different developmental histories which prevent differentiation between and independent functioning of the cerebral and autonomic activities in the concrete person while allowing for separation and autonomy of these sub-systems within the abstract individual (e.g., Harvey, 1967; Harvey & Felknor, 1968; Harvey, et al., 1961).

Belief systems, as we have come to treat them, differ both in content and structure, each representing a particular intersect between or pattern of content and the structural dimension of *concreteness-abstractness.* This is to say that a belief system at a given level of concreteness-abstractness also differs from the others in the content or referents which is focal or more central to it.

Concreteness-Abstractness

Of the many structural properties on which belief systems may be assumed to differ, our concentration, as implied above, has been on concreteness-abstractness, a quality of *how* the individual articulates and organizes or differentiates and integrates his concepts of ego-involving content (Harvey, 1967; Harvey & Felknor, 1968; Harvey, et al., 1961). Concreteness-abstractness, as we use the construct, refers to a superordinate conceptual dimension which encompasses a number of more molecular organizational attributes, such as degree of differentiation, extent of integration and centrality of the conceptual elements. Thus variation in concreteness-abstractness rests upon differences in patterning and organization and not on differences in the algebraic sum of these subordinate characteristics.

At the behavioral level, concreteness is manifested in a seemingly tight stimulus-response linkage, the extreme of which we have illustrated by the invariance of the moth flying taxically toward the light. More abstract functioning, on the other hand, due to its being based on a more complex and enriched mediational system which allows departure

from the immediate properties of a stimulus, is reflected in less stimulus-response oughtness and greater relativism and freedom of thought and action. From a wide variety of studies it has been found that greater concreteness is manifested in a variety of ways, including:

1. A simpler cognitive structure in regard to domains of high involvement (Harvey, 1966; Harvey, 1967; Harvey, Reich & Wyer, 1968; Harvey & Ware, 1967; White, Alter & Rardin, 1965; White & Harvey, 1965). Thus when not ego-involved or affectively aroused the concrete person can see as many alternatives and make as many alternatives and make as many distinctions among stimuli as the abstract individual. But under conditions of high involvement and arousal the performance of the abstract person on these dimensions is much higher than that of the concrete.

2. A greater tendency toward more extreme, either-or and good-bad judgements (Adams, Harvey & Heslin, 1966; Ware & Harvey, 1967; White and Harvey, 1965).

3. A greater reliance upon status and power than upon information and expertise as guidelines to beliefs and judgements (Harvey, 1964; Harvey, 1966; Harvey & Beverly, 1961; Harvey & Ware, 1968; Kritzberg, 1965; Tiemann, 1965).

4. A greater intolerance of ambiguity and uncertainty, expressed in higher scores on measures of authoritarianism and dogmatism and in the tendency to form judgements quickly of novel stimuli (Harvey, 1966; Reich, 1966; Ware & Harvey, 1967).

5. A greater need for cognitive consistency together with a greater tendency toward negative arousal from the experience of inconsistency (Harvey, 1965; Harvey, 1967; Ware & Harvey, 1967). While the concrete individual extols the virtues of being consistent in his beliefs he is actually *unknowingly* more inconsistent than the abstract individual but at the same time he experiences more discomfort when the inconsistency is made apparent to him.

6. A greater inability to change set and hence greater rigidity in the solution of complex and/or changing problems (Felknor & Harvey, 1963; Harvey, 1963; 1966; Reich, 1966).

7. A greater insensitivity to subtle cues in the environment and hence a greater susceptibility to obtrusive clues even when they provide false leads (Harvey, 1966).

8. A poorer capacity to "act as if," to assume the role of the other or to think and act in terms of a make-believe or hypothetical situation (Harvey, 1963; Harvey & Kline, 1965; Grabow & Harvey, 1968).

9. Holding opinions with greater strength and certainty that the opinions will not change (Hoffmeister, 1965).

10. A higher score on the factor of dictatorialness as reflected in such behavior as high need for structure, low flexibility, high rule orientation, high dictation of procedure, high frequency of the use of unexplained rules, and low encouragement of individual responsibility and originality (Harvey, White, Prather, Alter & Hoffmeister, 1966; Harvey, Prather, White & Hoffmeister, 1967; Coates, Harvey & White, 1968).

11. A greater tendency toward trite and normative behavior and thus a lower tendency toward innovation and creativity (Brown & Harvey, 1968; Harvey, 1966).

12. A greater tendency to form and generalize impressions of other people from highly incomplete information (Ware & Harvey, 1967).

Greater abstractness has been found to result in the opposite behavior on the preceding dimensions.

Four Specific Belief Systems

General Description

From the interaction of concreteness-abstractness with ego-involving content a number of belief systems may be deduced. Although Harvey, et al., (1961) did infer and treat several such patterns of structure and content, my own major research effort has centered around the four summarized below.

System 1. This mode of construal and responding to the world best fits the description of concrete functioning presented earlier.

System 2. This system, only somewhat more differentiated and integrated than System 1, differs in its representatives tending to distrust, reject and weigh negatively many of the cues, especially those relating to established custom and authority, which are used as positive guidelines and signs of validity by persons of System 1.

System 3. Representatives of this system are more abstract, less dogmatic, less pro- or anti-establishment, and less evaluative than individuals from either System 1 or System 2. At the same time they are more concerned with interpersonal harmony, empathic understanding, mutual dependencies and highly developed skills of interpersonal manipulation aimed at averting social isolation, aloneness, interpersonal rejection and failure when having to perform alone.

System 4. This, the most abstract of the four systems, is characterized by high task orientation, information seeking, low dogmatism, creativity (in the sense of offering solutions to problems that are high in *both* novelty and appropriateness), openness to inputs from diverse sources and a high independence of judgement.

Measurement of Belief Systems

We have developed two instruments specifically as measures of conceptual or belief systems. The "This I Believe" Test, a semi-projective sentence completion test, has been used most extensively and successfully. The Conceptual Systems Test is an objective scale more recently developed and much less extensively used and validated.

The This I Believe (TIB) Test

The TIB, developed specifically as a measure of conceptual or belief systems (e.g., Harvey, 1964, 1965, 1966; White & Harvey, 1965) requests the individual to indicate his beliefs about a number of socially and personally significant concept referents by completing in two or three sentences the phrase, "This I believe about _____," the blank being replaced successively by each of such referents as "religion," "marriage," "friendship," "the American way of life," "sin," "education," "the family," "compromise," "capital punishment," and "world government." With the aim of facilitating the production of spontaneous and uncensored responses, a two minute time limit, controlled by the experimenter, is typically allowed for responding to each referent. The completions written by the subjects are evaluated with regard to several dimensions involving both structure and content. From the relativism, tautologicalness, novelty and connotative implication or richness of the completions, together with criteria implied in the earlier characterizations of the four belief systems, respondents may be classified into one of the four principal belief systems posited by Harvey, et al., (1961) or into some admixture of two or more systems.

Specifically, respondents are classified as representing System 1 if their completions denote such attributes as high absolutism, high tautologicalness, high frequency of platitudes and normative statements, high ethnocentrism, high religiosity, polarized judgements, and identification with the dominant American motif.

Individuals are categorized as representing System 2 if in addition to being highly evaluative and absolute they express strong negative attitudes toward such referents as "marriage," "religion," and others reflective of the dominant American theme without giving much thought to the possible results of negating these referents or consideration of alternatives.

Responses to the TIB are scored as indicating System 3 functioning if they indicate more relativism and less evaluativeness than Systems 1 and 2 and at the same time express strong positive beliefs about friendship, people and general humanism and imply that friendship and/or people are a necessary and critical aspect of their existence.

System 4 functioning is inferred from the TIB responses that imply a high degree of novelty *and* appropriateness, independence without negativism, high relativism and contingency of thought, openness to new information, the general use of multiple dimensions instead of single dimensions in their judgments and statements that are highly integrated and informationally loaded.

The average interjudge reliability of TIB scorings, based on six specific comparisons, has been .91. Test-retest reliabilities, within one week and after six months, each has been in the high .80's.

The Conceptual Systems Test (CST)

The items in the CST were derived from statements made by subjects in their completions of the TIB and from certain other tests purporting to measure personally aspects related to dimensions within the different belief systems. Factor analysis of each of eight revisions of the CST by Tryon's method of cluster analysis (Tryon & Bailey, 1965) has yielded six highly consistent clusters. They, with some of their representative items are:

1. *Divine Fate Control* (DFC) is assessed by such items as "I believe that to attain my goals it is only necessary for me to live as God would have me live," "Marriage is the divine institution for the glorification of God," and "There are some things which God will never permit man to know."

2. *Need for Structure and Order* (NSO) is inferred from such items as "I like to have a place for everything and everything in its place," "I like to have my life so arranged that it runs smoothly and without much change in my plans," and "I like to plan and organize the details of any work that I undertake."

3. *Need to Help People* (NHP) is tapped by such items as "I like my friends to confide in me and tell me their troubles," "Contributing to human welfare is the most satisfying human endeavor," and "I enjoy making sacrifices for the sake of the happiness of others."

4. *Need for People* (NFP) is measured by such items as "I like to join clubs or social groups," "I like to make as many friends as I can," and "I like to do things with my friends rather than by myself."

5. *Interpersonal Aggression* (IA) is assessed by such items as "I feel like telling other people off when I disagree with them," "I feel like getting revenge when someone has insulted me," and "I feel like making fun of people who do things I regard as stupid."

6. *General Distrust* (GD) is derived from such items as "These days a person doesn't really know whom he can count on." "You sometimes can't help wondering whether anything is worthwhile anymore," and "Anyone who completely trusts anyone else is asking for trouble."

The mean score of each of the four systems, as measured by the TIB, on each of the CST factors, conforms closely to the theoretical attributes described earlier. The CST can be used in a variety of ways, including placement of respondents into the four belief systems. When used for system classification, pre-established cut-off values are utilized for each factor. On the basis of a great deal of empirical fitting, an individual is classified as representing System 1 if his mean score on Divine Fate Control is equal to or greater than 4.19. An individual is classified as System 2 if his mean score on Divine Fate Control is 4.19 or less, his mean score on Interpersonal Aggression is 3.75 or more and his mean score on General Distrust is 3.39 or more. A person is classified as representing System 3 if his mean score on Divine Fate Control does not exceed 4.19, his mean score on Interpersonal Aggression is no greater than 3.75 and his mean score on Need for People is 4.10 or more. A person is classified as representing System 4 if his mean score on Divine Fate Control does not exceed 4.19, his mean score on Need for Structure-order is no more than 4.10 and his mean score on Interpersonal Aggression is 3.75 or less.

Our experience so far has been that classifying individuals as representing one of the belief systems by use of the CST parallels quite closely the classification by the TIB for Systems 1, 2 and 3 but not so closely for System 4. The superiority of the TIB over the CST in identifying System 4 representatives is attributable, in our opinion, to the fact that the TIB is sensitive to both novelty and integration of responses, each of which is weighted heavily in classifying an individual as representing System 4, while the CST, as it currently exists, measures neither of these factors.

Given the preceding picture of basic differences in the construal and response tendencies of representatives of the different belief systems when viewed *cross sectionally* or in terms of present functioning, it becomes important to examine the developmental determinants of these differences. An answer to the question of how representatives of the different systems came to be the kinds of persons they are would have clear implications for anyone, including educators, concerned with providing the necessary conditions of fostering change and growth in intellectual and self-development. As I shall try to indicate, the history of acquisition of belief systems must be taken into account if efforts at changing them are to be effective.

In the next section some of the apparent determinants of the four belief systems will be examined briefly. Then some specific implications of these and the preceding materials for education will be suggested.

Some Developmental Determinants of the Four Systems

In the original work of Harvey, et al., (1961) a variety of differences in developmental histories were posited among representatives of the four preceding systems. Most of these assumed differences center around childhood independence and the corollary issues of freedom of exploration and the locus and consistency of rewards and punishments. By focusing on these factors and considering behavioral differences among representatives of the different systems, such as those noted previously, it is possible to make some tenable deductions about their likely parent-child antecedents.

For example, the findings that representatives of System 1 are more concerned with the public presentation of self and the living up to role and status definitions, have a high need for cognitive consistency and the avoidance of cognitive imbalance and dissonance, believe more strongly and prevalently in divine fate control and think and act in terms of discontinuous definitions of the world, would, together with other characteristics noted previously, lead to certain expectancies about the familiar genesis of such functioning. Among other things, the parents of a developing System 1 child should be expected: to present a united front to the world, including the child, and thus resolve interpersonal conflicts behind closed doors; to maintain an air of propriety toward the child and thus respond more aloofly in terms of status and role definitions than in terms of personal warmth and affection; to permit little diversity among family members in their beliefs about issues of high involvement, such as morality and religion; to stress religion and frequent church attendance; to use explanation sparingly and physical punishment frequently as responses to rule induction and violation; to reward consistently those behaviors which conform to the parents' standards with the result that adherence to the rule becomes ritualistic, an end in itself rather than a means of achieving a superordinate goal; to instill the child with the dominant American motif and to push him toward success in terms of these social criteria; to imbue the child with concern about reflecting socially unfavorably upon himself and his family; to distinguish poorly between the act and the actor and to praise or punish the actor instead of the act; and to behave discontinuously toward the child as a function of the latter's age, being highly restrictive and controlling when the child is young but more permissive once the child has shown evidence of incorporating the standards of the parent by behaving in accordance with these standards in a consistent way. Moreover, the father of a System 1 child is expected to be the more dominant parent in accord with the socially prescribed role. In addition,

because of his somewhat Spartan conception of manhood and his acceptance of the traditional notion of the delicacy of womanhood, he should make more demands of a son, be more concerned with a son's success and failure in meeting the established standards and in general be more strict and punitive toward a son than toward a daughter.

The parents of the developing System 2 child should be expected to manifest inconsistencies along a variety of dimensions, including rewards and punishments, the giving and withholding of affection, and in their responses toward important social norms and institutions; to leave the child with the feeling of being on his own not out of respect for his ability but out of indifference; to evaluate his performance negatively without having previously provided any clear indication of the criteria for evaluation; to make no effort to conceal the relatively frequent family discord; to give very little explanation to the child for the demands made of him; and to be punitive, controlling and capricious toward him. In addition, it is quite likely that the father of a System 2 child would be less dominant than the mother and less personally involved in the day to day child rearing.

The mother of a System 3 child may be inferred to be similar to what has been described as overprotective (Levy, 1943). While reluctant to use physical punishment, she exerts tremendous control over the child through a dependency relationship coupled with overindulgence and the potential threat of love withdrawal. The father may or may not behave similarly to the mother. But if not, it is suggested that, rather than providing a balance or compensation for the behavior of the mother, the father displays a sort of indifference toward the whole matter and remains somewhat distant and affectionally isolated from the child and in so doing enhances the dependency relationship between the mother and the child. Probably both parents, but especially the mother, are thought to be very concerned with the social acceptance and the social achievements of their child as long as these do not endanger the mutual dependency bond between them and the child.

The parents of the developing System 4 child should be expected to allow diversity of opinions without rancor; to encourage exploration of the physical world as well as of social values and assumptions; to foster independence while providing a basic sense of security; to treat the child as a person of intrinsic worth; to allow the child to choose his own goals and level of achievement; to use explanation frequently, to distinguish between affect toward the child and evaluation of his act; to display consistency without rigidity; and to be more equally involved in the definition and implementation of child rearing policy and practice.

Until recently these assumptions of parent-child differences among representatives of the four belief systems remained more conjectural

than established, although the one study that had been carried out on this problem (Adams, Harvey & Heslin, 1966) had yielded results consistent with these assumptions. In a recent study Felknor and Harvey (1968) tested most of these assumptions in some detail and confirmed most of them. Male and female college representatives of each of the four systems, selected by the "This I Believe" Test, each completed a specially constructed Parent-Child Relationship Questionnaire (PCRQ) which was designed to assess several areas of parent-child relations, such as punishment, independence, approval, control, etc. With the aim of discovering possible changes or continuities in the relationships with changes in the child's age, many of the questions were repeated for three age levels, before the age of six years, age six to twelve and age thirteen to seventeen, age levels which were assumed to agree with the periods of early childhood, middle childhood and adolescence during which the role of the child would be undergoing changes.

In its final form the questionnaire consisted of 70 items: 62 dealing with parent-child interactions (e.g., frequency of punishment, type of reward, amount of dependence, approval of friends, etc.); six focussing on the relationship between the parents (e.g., disagreement about goals for the child); and two concerning church attendance. The 62 items on parent-child interactions were answered separately for mother and father, thus providing separate descriptions of the respondent's relationship with each parent. Responses were made on either a six-point or a seven-point scale except for the questions regarding types of punishment and reward which involved discontinuous alternatives and asked the respondent to check those which he recalled being used by his parents. For items which asked about the amount or degree of some trait (e.g., how strict), answers ranged from "extremely" to "not at all." For items which asked about the frequency of occurence of some phenomena, answers ranged from "always" to "never."

A factor analysis of the responses by Tryon's method of cluster analysis (Tryon & Bailey, 1965) yielded 11 clusters each for mothers and fathers.

The mother clusters consisted of (1) fairness and rapport, (2) variety of rewards before 6 through 17, (3) variety of punishment before 6 through 17, (4) arbitrariness before 6 through 17, (5) disagreement with father regarding the child, (6) strictness and control before 6 through 17, (7) freedom and independence before 6 through 12, (8) dependency on mother before 6 through 17, (9) concern with social impressions, (10) frequency of punishment before 6 through 12 and (11) warmth and approval.

The father clusters were (1) fairness and respect toward child and support for mother, (2) variety of rewards before 6 through 17, (3)

variety of punishments before 6 through 12, (4) arbitrariness before 6 through 12, (5) disagreement with mother regarding the child, (6) strictness before 6 through 12, (7) control before 6 through 12, (8) dependency on father before 6 through 12, (9) concern with social impressions, (10) frequency of punishment before 6 through 12, and (11) strictness, arbitrariness and control 13 through 17.

A variety of comparisons on these clusters as well as between such nominal dimensions as kind of punishment and kind of reward basically confirmed and extended the deductions outlined earlier concerning differences among representatives of the four systems in their relations they recalled with their parents.

The picture gained of the different developmental conditions and processes undergone by representatives of the different systems is consistent with the assumption outlined earlier that representatives of Systems 1 and 2, especially the former, acquire their concepts of high involvement catechismically and as conditioned responses while representatives of the more abstract systems, particularly System 4, acquire their concepts, of both high and low affectivity, insightfully and inductively through exploration and direct experience. One significant implication of this is that high affective arousal is more likely to impair the performance of concrete persons than of abstract individuals. Moreover, owing to differences in their developmental histories, representatives of the different belief systems should differ in the cues they use to validate a situation, in the kinds of persons they trust and are willing to rely upon or be influenced by, in who is an effective communicator or teacher for them, in the kinds of rewards and punishments to which they are receptive, and thus in the kinds of tasks and social conditions that are likely to produce sub-optimal, optimal and super-optimal arousal for maximum achievement. I will later present in some detail the results of certain of our studies that bear directly on these questions.

Some Educational Implications

Teachers' Belief Systems, Classroom Atmosphere and Influence on Students

Probably the most crucial determinant of the classroom environment, and thus of the learning conditions surrounding the students, is the behavior of the teacher and the atmosphere she produces. In turn, her behavior, the resulting classroom atmosphere and the influence she has on her students are all influenced heavily by the nature of her beliefs. Of the several studies we have carried out on this general topic, two, because of their relevance to this conference, will be reported in some detail.

In the first of these studies (Harvey, White, Prather, Alter & Hoffmeister, 1966) concrete and abstract teachers of kindergartners and first-graders were observed in the classroom and rated by pairs of trained judges on 26 dimensions assumed to reflect attributes relevant to the fostering of flexibility, adaptability and creativity in children. The rating categories were: (1) expression of warmth toward the children, (2) perceptiveness of the children's wishes and needs, (3) flexibility in meeting the needs and interest of the children, (4) ability to maintain relaxed relationships with the children, (5) attention to the individual child, (6) task involvement, (7) enjoyment of teaching, (8) enlistment of child participation, (9) encouragement of individual responsibility, (10) encouragement of free expression of feelings, (11) encouragement of creativity, (12) teaching new concepts, (13) ingenuity in improvising teaching and play materials, (14) utilization of physical resources, (15) task effectiveness, (16) diversity of activities simultaneously permitted, (17) smoothness of classroom operation (especially in the transition from one activity to another), (18) consistency of rule enforcement, (19) use of functional explanation of rules, (20) use of unexplained rules, (21) rule orientation, (22) determination of classroom and playground procedure, (23) need for structure in teaching activities and relationships with children, (24) punitiveness, and (25) anxiety induced by observers' presence.

Teachers representing System 4 differed from representatives of System 1 in what was presumed to be the direction favoring adaptability and flexibility on all 26 dimensions.

In addition, the 26 dimensions were factor analyzed and three major factors extracted: teacher resourcefulness, dictatorialness and punitiveness. System 4 teachers were more resourceful, less dictatorial and less punitive than System 1 teachers.

After having demonstrated in the preceding study that concreteness-abstractness of teachers' belief systems influence the kind of classroom environments they create, a study was carried out to assess the influence of teachers' beliefs and behavior upon the performance of their students. In the second study (Harvey, Prather, White & Hoffmeister, 1968) concrete and abstract teachers of kindergarten and first-grade were again rated by a trained observer on the same rating scale as above. In addition, the students were rated on the following 30 performance dimensions: (1) overall adherence to the teacher's rules, (2) immediacy of response to the rules, (4) information seeking, (5) independence, (6) cooperativeness with the teacher, (7) task attentiveness, (8) enthusiasm, (9) voice in classroom activities, (10) voluntary participation in classroom activities, (11) free expression of feelings, (12) diversity of goal relevant activities, (13) student-initiated activity, (14) amount of activity, (15) considerateness toward classmates, (16) reciprocal affection

between classmates, (17) cooperation with classmates, (18) taking turns with classmates, (19) amount of interaction with classmates, (20) novelty of response to problem or teacher's question, (21) appropriateness of response, (22) accuracy of facts, (23) integration of facts, (24) orientation toward specificity of facts (vs. more general principles), (25) roteness of answers or solutions, (26) active hostility toward the teacher, (27) passive hostility toward the teacher, (28) aggression toward classmates, (29) guidance seeking, and (30) approval seeking.

In addition to replicating the results of the first study (Harvey, et al., 1966), the second study also found students of concrete and abstract teachers to be differentially influenced in the ways anticipated. A factor analysis of the 31-item student rating scale yielded seven factors, termed (1) cooperation, (2) student involvement, (3) activity level, (4) nurturance seeking, (5) achievement level, (6) helpfulness, and (7) concreteness of response. Students of more abstract teachers, in comparison to their counterparts, were more cooperative, more involved in classroom activities, more active, higher in achievement, more helpful, lower in nurturance seeking and less concrete in their responses.

Clearly, then, teachers' belief systems affect both the way they behave in the classroom and the influence they exert upon their students. In addition, the results of the two preceding studies, which recently have been replicated and extended (Coates, Harvey & White, 1969), point strongly toward the hypothesis that to produce open, flexible, adaptive and creative students it is necessary, among other things, to first have abstract teachers.

At the same time, however, other of our findings make it clear that the goal of filling the classrooms with abstract teachers is not a realistic one within the foreseeable future because currently only a small percentage of teachers (approximately 7 per cent) appear to be functioning at the level of System 4 while a large majority represent clear System 1 functioning or an admixture of System 1 with System 3. Moreover, the majority of superintendents, principals and student teachers whose belief systems have been assessed have also been found to represent predominantly System 1 functioning (Moellenberg, 1966; LeMarr, 1968; Dahms, 1969). It might be added as an interesting aside that of the several hundred active teachers we have studied in Colorado a clear representative of System 2, the anti-establishment orientation, has yet to be found. This presumably is the result of a chain of events, starting with selection of students to become teachers, teacher training, hiring practices and attrition due to disparity between the orientation of a System 2 representative and the constraints seemingly imposed by most school administrations.

It should be noted that my emphasis upon the teacher as the crucial

instrument for inducing abstractness in students runs somewhat counter to the widespread effort currently underway of attempting to improve education primarily through innovations in method and curriculum. I do not wish to speak against the efforts at curriculum innovation; but I do wish to indicate a strong belief, based upon what I think is evidence, that curriculum techniques and method interact with the belief system and style of the teacher, the result being that a particular kind of curriculum or method may be very effective as practiced by one teacher and be a dismal failure in the hands of another. One of the more distinct impressions we have gained from the observations of several hundred classrooms is that the System 4 teacher is innovative and improvising in materials, resources and approaches to teaching while representatives of System 1, even when provided with abundant physical resources and equipment, still behave dictatorially and in ways that restrict the freedom and exploration of the students.

Obviously, were I to follow my inclination, I would at this point move toward demonstrating the importance of teacher selection, training and retraining as a means of enhancing abstractness in students. However, since these are broad areas in and of themselves and are not accessible to immediate solution, I will examine the possible use of other means in inducing abstractness among students.

Modifying Belief Systems Toward Greater Abstractness

Since adaptability, flexibility, creativity and general conceptual openness are characteristics of more abstract functioning, especially System 4 activity, it follows that if a certain level of abstractness were achieved by the student the corollary characteristics would tend to follow. The question then becomes: How can an individual functioning at some level lower than System 4 be induced to change in such a way that he can achieve System 4 functioning? The answer probably is that different methods and approaches must be used for each of the less abstract Systems 1, 2, and 3. Before dealing specifically with this question, however, two kinds of change, and reciprocally two bases of resistance to change, need to be explicated.

Defensiveness and Ignorance As Bases of Resistance to Change

In those instances where an individual is ignorant simply because of lack of information, i.e., his failure to know and understand something is due to not having been exposed to proper information at a strategic moment in his life span, and not to defensive and distortion processes stemming from prior sets, commitments, evaluative and interpretive tendencies, information will tend to suffice to produce the desired

change. But it must be noted that for information to be received and processed effectively implies an open system, one by which its possessor is not driven to ward off the novel and the different or to process the information according to rigidly defined categories.

Our research has indicated clear differences among representatives of the concrete and abstract belief systems in the extent to which they can make discriminations and effectively process informational inputs under conditions of high involvement and arousal. As indicated in the earlier discussion of the developmental determinants of the four belief systems, these differences might be attributable to the differential operation of the autonomic and cerebral processes within the concrete and the abstract individual. This is based on two assumptions, (1) that the more central beliefs of the concrete person were acquired pretty much as conditioned responses while those of the abstract individual are acquired more as inductive and insightful concepts and that (2) consequently the autonomic and central processes within the concrete person are undifferentiated, but differentiated and independent within the abstract person. Thus, it is hypothesized, involvement and arousal within the concrete individual results in domination by the autonomic system and an inability to cerebrally and informationally process inputs while involvement and autonomic activity within the abstract person does not readily interfere with his cerebral functioning and information processing.

Differential Effects of Arousal

In a recently reported study, Harvey, Reich and Wyer, (1968) investigated the differentiation of concrete (Systems 1 and 2 combined) and abstract individuals (Systems 3 and 4 combined) on two measures under three levels of involvement in the stimuli being differentiated. When judging stimuli toward which they were low in involvement, the concrete subjects made more differentiations both within and among those stimuli than did the abstract individuals. But under heightened involvement at both the middle and high intensity levels, the reverse was the case. As we summarized these results, "the concrete subjects achieved their highest scores on both measures of differentiation when their attitudes toward stimuli were least intense and decrease their performance rather rapidly as the intensity of their attitudes increased. The differentiation of the abstract subjects on both measures was similar at all three levels of attitudinal intensity (p. 477)." These results were interpreted as being "consistent with the assumptions concerning the developmental histories of these individuals . . . Concrete individuals presumably have a high level of arousal conditioned to stimuli about which they report intense attitudes. The rating of these stimuli may elicit this arousal which impairs their differentiation. On the other hand, abstract

persons either do not have conditioned emotional responses to stimuli toward which they have intense attitudes, or their differentiation is not impaired by arousal (p. 477)."

A study just completed and in the process of being reported by Grabow and Harvey (1969) obtained results similar to the preceding ones although a different measure of arousal, namely Spielberger's test of state anxiety was employed. Spielberger's test was administered to Introductory Psychology students under the instructions that their grade in the course would depend partially upon their performance on the dependent variables which consisted of parts of the Wechsler Adult Intelligence Scale, Vocabulary, Arithmetic and Digit-Symbol Substitution, and a role playing task in which the subject was required to present in writing his arguments both for and against the American way of life. In the analysis representatives of Systems 1 and 4 were divided, by the median split, into High and Low Anxiety groups. On all seven dependent variables (four role playing and three intelligence variables) except Digit-Symbol Substitution System 1 representatives decreased their performance under increased anxiety while System 4 individuals increased theirs. This was especially the case for performance on the Vocabulary test. On the Digit-Symbol Substitution Task representatives of both systems decreased their performance under heightened anxiety. These results are being interpreted to mean that the central processes of System 1 subjects were impaired by anxiety while they tended to be facilitated for abstract individuals. The reversal for the abstract subjects on Digit-Symbol Substitution possibly may be attributable to the involvement of a motor task on which they too were impaired by anxiety.

A third study that relates to the two immediately preceding ones and also suggests some of the social conditions that may impair or facilitate the performance of the representatives of the four systems was reported by Harvey in 1963. Representatives of each of the four belief systems played a role which involved arguing against their own stand on the target issue (i.e., whether or not philosophy should be required as a minor for all undergraduate college students) under either an *anonymous* or *authority surveillance* condition. Under the anonymous condition subjects were assured that no one, including the experimenter, would ever hear their tape-recorded arguments, which although erased by the subject himself were also recorded surreptitiously by the experimenter. Under authority surveillance, however, subjects were cautioned to not erase their tape-recorded arguments as they played them back to themselves since the tapes were to be turned over to a university curriculum committee that was currently reviewing the whole general question of undergraduate minors.

Predicted main and interactional effects were obtained. Performance

was higher under the anonymous than under the surveillance condition and System 4 representatives outperformed representatives of the other systems under both conditions. Of greater relevance to education perhaps were the interactive effects, especially the striking difference in the performance of System 2 individuals under the two conditions. When performing anonymously, these individuals consistently out-performed System 1 subjects, achieved higher scores on several of the role playing dimensions than did representatives of System 3 and performed almost as well as System 4 individuals in several instances. Under the authority surveillance condition, however, the performance of System 2 subjects became the worst of the four conceptual groupings.

A study that has bearing on some of the issues raised by the role playing study (Harvey, 1963) was conducted by Brown and Harvey (1968). High school representatives of the four belief systems were administered a battery of creativity tests by a faculty member of the school who pointed out that no consequences would derive to the students from their performance on the tests. Whereas System 2 college students had performed almost as well as System 4 individuals on the creativity aspects of the role playing under the anonymous condition, System 2 high school subjects performed no better than, and in several cases worse than, their System 1 counterparts, parallelling the results obtained in the role playing under authority surveillance. Thus it appears that while System 2 individuals can behave creatively when free of the observation of an authority, a condition that rarely exists in the school system, their performance, at least on certain kinds of tasks, decreases when it is to become the knowledge of and possible basis of action by a representative of institutional authority.

Neither the role playing study by Harvey nor the investigation by Brown and Harvey touched upon the important question of how the differential performance under the different social conditions is mediated. Is it, we asked later, that the individual, especially the System 2 representative *cannot* or *will not* perform as well on the particular tasks when that performance is to be known to an authority figure. That is, is the decrement more attributable to such a factor as super-optimal arousal and depressing of central processes by autonomic activity or to a general negativism and refusal to try? Moreover, we subsequently wondered, is it the status or power (i.e., the formal position or the fate control of the "authority" that seemingly affects adversely the performance of the System 2 individual? A study currently underway in which the performance of high school representatives of the four belief systems on several complex tasks under three levels of induced arousal should help resolve these kinds of questions.

Confirmation of the general hypothesis that differential performance

of concrete and abstract subjects is mediated by arousal and autonomic activity would have clear implications for educators. It would say, for example, that in order for the more concrete students to learn in ways we espouse, that is inductively and insightfully, that they particularly must be surrounded by conditions that minimize the activity of the autonomic system. This, in turn opens up a broad but significant area of research: to determine the classroom and pedagogical methods that accomplish this. Of these, clearly attributes of the teacher and the environment he or she creates in the classroom are crucial. The methods of System 1 teachers, which involve high surveillance, high dictatorialness, high costs to students for failure and the apparent conception of students as chattel or pawns, to borrow a term from Dick de Charms (1969), are bound to result in failure for most students, particularly the more concrete ones. This is not to say that the methods of the System 1 instructor may not effectively inculcate certain responses catechismically and as conditioned responses but they cannot produce learning with insight and the ability to be open, independent, flexible and creative individuals.

In an address a couple of years ago entitled "Feudalism Revisited: A Sojourn Into Graduate Education," (Harvey, 1967) I attempted to examine certain parallels between practices in the German concentration camps and the typical educational process. I intended to be neither cynical or amusing but rather to first depict the factors I had isolated as causing identification of the Jewish prisoners with the Nazi guards and then to examine the possible extent to which those same variables were operating in the school systems, from kindergarten through graduate school. After many years of thinking about the problem, I concluded that by the manipulation of three factors individuals can be made slaves and human robots. These are: (1) external fate control, i.e., the condition in which one's fate (his rewards, punishments, etc.) are determined by an outside agent over whom he has no direct influence; (2) high involvement, which in the concentration camps centered around life itself and which in education, especially at the graduate level, centers around self worth and esteem; and (3) capriciousness or intermittent reinforcement, which generates conditions in which the recipient can never ascertain what he is to do to gain consistency and the feeling of some degree of control over his own fate.

It is apparent, I believe, that external fate control, high involvement of students (i.e., threat) and capriciousness of teachers and fate controllers characterize most of our current socialization processes, including education. Many persons today in education seem to be perpetuating and even strengthening these tendencies under the assumption they are helping to obliterate them. Among such persons I would include not

only System 1 teachers in the classroom but many university-based "experts" who are espousing certain varieties of operant conditioning and of the so-called discovery and inquiry methods. This is not meant to be an indictment of these latter approaches in general but rather of those practitioners who operate from a kind of unwitting omniscience and omnipotence that results in *their* defining the elements to be discovered or what the reinforcers shall be without influence from the students, in *their* imposing the rules or routes for inquiring and/or prescribing on *their* own the contingencies of reinforcement, and in *their* deciding according to *their* criteria when the performance is satisfactory and should be rewarded. I recently asked a well known person in the "inquiry" method if the teacher prescribed the elements of the problem, the rules for exploration and the conclusions that were warranted should we be surprised that the student reaches the same conclusion as the teacher. The only thing the student can discover under those conditions, it would seem to me, is what the teacher has in her mind, not new approaches and solutions to the problem.

Students have come to understand and become concerned about the general conditions of current education. Much of their present agitation and assault upon the establishment center around the same issues that have sparked many revolutions. To continue the reinforcement language, these issues largely boil down to a desire to help define and prescribe the nature of the reinforcers, the conditions of their administration and who shall administer them. Again, it should not be surprising that people, including students, should want to have a hand in these instead of relinquishing this incredible power to an omnipotent and omniscient external agent.

Application of Attitude Change Methods to the Fostering of Abstractness

For young children whose belief systems have not yet crystallized and stabilized abstractness may be fostered by the provision, in the home and the school, of the kinds of environments described in System 4 teachers. Progression toward System 4 functioning can, at least theoretically, be facilitated in the young child by the environment that encourages him to explore both his physical world and his world of values, to discover new elements and to put them together in his own way without fear of punishment and/or rejection. Note that these conditions, which might be termed a *process orientation*, could be made to surround the imparting of any educational content or subject matter, from poetry through physics, and therefore that any one of these topics could be used as a vehicle for inducing abstractness as well as another.

However, since students seemingly develop their belief systems quite early, from home and early school experiences the question of how to *change* them rather than to influence their original formation becomes important. This section of this paper will attempt to make application of findings in attitude change research to this general question. The application will center around the basic issue of what kind of "source" (and presumably teacher) is effective for enhancing change in respondents (hopefully, including students) of different belief systems. An effort will then be made to apply some of these notions of attitude change to the effective use of educational media.

Characteristics of an Effective Source

System 1. The apparent nature of this system would imply that in order for a source or teacher to be a "significant other" in the eyes of its representatives and to be able to influence them in a direction counter to their own beliefs he should be of high formal status, behave in accordance with clear-cut definitions and issue highly structured and rule oriented messages.

In line with this hypothesis, Crockett (1958) found more authoritarian soldiers to prefer more autocratic leaders. And in an unreported study, Harvey found that college students representing System 1, to a greater extent than representatives of the other systems, preferred instructors who were high in academic rank, gave precise and highly structured assignments, made the criteria for grading very explicit, and gave lectures of greater absolutism and simplicity, i.e., of fewer contingencies, more "facts" and fewer theoretical interrelationships.

In further accord with this reasoning are the findings from several experiments that concreteness (as measured by scales of authoritarianism) tends to be positively correlated with attitude change (e.g., Crutchfield, 1955; Wagman, 1955; Christie & Cook, 1956; Titus and Hollander, 1957; Harvey, 1963c; Harvey & Beverly, 1961; Wright & Harvey, 1965). Significantly, the relationship between authoritarianism and attitude change holds only for a high status source. As we have suggested, "Authoritarianism is positively related to opinion change when the source of the incongruous input is of high status and the target concept is of low involvement. But it is negatively related to change when the source is of low status, and the target concept is of high involvement." (Wright & Harvey, p. 180).

That concreteness sensitizes an individual toward status and power may be inferred from a number of studies (e.g., Harvey, 1963a; 1964, 1966; Harvey & Beverly, 1961; Kaitzberg, 1965; Tiemann, 1965). At least four studies have dealt specifically with source characteristics and influence on representatives of different belief systems.

The first of these studies was carried out by Harvey and Beverly (1961). Following refutation of their preassessed attitudes toward alcohol by a high status and powerful source, subjects varying in concreteness were asked to reproduce the main arguments of the speaker (who was both their instructor and minister of their church) had made in favor of alcohol. Despite changing their opinion more in the direction of the communication, the more concrete and authoritarian subjects were able to reproduce fewer of the speaker's points than were the persons lower in authoritarianism. Thus the more concrete individuals appear to have changed their opinions more because of the status of the source than from their grasp of the reasons he advanced for a change.

In a second study (Harvey, 1964) college student representatives of the four systems among other tasks, judged the contents of 16 projected slides of varying clarity following exposure to a pre-recorded narration that described the contents of each slide in a general way. The contents of the *nine more ambiguous slides* were incorrectly depicted while the contents of the seven slides of *greater clarity* were correctly described. The narration accompanying projection of the slides was attributed to either an undergraduate student interested in photography (*low status* source) or to a professor of psychology interested in the slides as experimental stimuli (*high status* source). As hypothesized, the number of incorrect descriptions accepted in identification of the slides under the high status condition was greater for System 1 than any other system.

A third, and unreported study on this topic was carried out by Ware and Harvey (1968). College student representatives of each of the four belief systems first formed, alone, judgmental norms of the distance between pairs of lights in a dark room. They were then exposed to judgments of a source (a trained collaborator) that deviated from their individual norms by a prescribed amount. The source of the deviant judgments was a person who in the eyes of the subject represent one of four combinations of expertise and status; high expertise-high status, high expertise-low status, high status-low expertise and low status-low expertise. Following the influence situation, subjects again made judgments of light distance alone with no mention of rewards. They then made additional judgments under the instruction that the most accurate person would receive a cash award. This procedure thus allowed us to determine the influence on individuals of different belief systems of different kinds of sources under surveillance and non-surveillance and under a no-cost and potential reward condition. Main effects, first-second and third order interactions were obtained. Of greater relevance here is the finding that representatives of the different belief systems relied upon different source characteristics in both changing their judgments and maintaining the changes. As anticipated, System 1 individuals

relied on the status of the source and not on his expertise. Thus they changed their judgments equally highly when the source was of high status and low expertise as when he was of high status and high expertise. On the other hand, System 2 individuals were most influenced by the low status-high expertise source; System 3 individuals by the high status-high expertise source; and System 4 individuals, to the extent they were influenced at all, by the dimension of expertise, being equally influenced by low status-high expertise as high status-high expertise.

The fourth and most recent study of this question is the doctoral dissertation of Bernardo Garso at the University of Utah (1969). Subjects, who were representatives of Systems 1 and 2 at the Utah State Training School for Boys, were exposed simultaneously to "messages" from a high status and a low status source. In one part of the study subjects listened dichotically to numbers they had been instructed to listen to by a high and low status source; in the second part of the study they were read two stories at the same time from the different status sources. In both instances, System 1 boys were more influenced by the high status than by the low status source while the reverse was true for the System 2 individuals.

Not only is overt-behavior change, which ultimately may be no more than acquiesence, facilitated in the concrete individual by a high status source, it is further enhanced by the source making strong and absolute assertions. Thus Harvey and Rutherford (1958) found that more concrete individuals changed their concepts of light movement more from an absolute than a gradual approach, i.e., from an approach in which the source made all of his judgments differ a fixed amount from those of the subject instead of first making his judgments match those of the subject and then gradually deviate from them.

That a high authority source making strong and absolute assertions will modify the overt response of the more concrete subjects, at least as long as the authority is present, seems clear. But it appears, according to the Harvey and Beverly study (1961), that this behavior change is not accompanied by understanding. If, as we educators proclaim, education is aimed at producing *change with understanding,* then other steps have to be taken to increase the abstractness of System 1 individuals. It is likely that high status sources making absolute statements, while fitting in with what System 1 individuals seek and are familiar with, will only tend to strengthen their concreteness, although at the same time such a combination of source and absolutism may result in their catechismic acceptance of what is being advocated.

To gain acceptance from a System 1 individual at the same time he is being rendered conceptually more open and abstract would seem to demand a strategy that at the outset of the change attempt provides a

great deal of structure and guidance from high status sources but which with time and experience move away from external structure toward requiring the individual to make more and more decisions on his own. This would represent a kind of weaning from the need for guidelines imposed by an outside authority toward the individual assuming independently the responsibility for his own criteria of behavior. From earlier indications, it would appear likely that a System 4 teacher could best provide the environment and conditions necessary to achieve this. A concrete teacher, because of the paucity of her response repertoire and inability to act as if, would have greater difficulty in "wearing the several hats" that would be required in providing the optimal amount of structure and guidance to the developing or changing student.

Systems 2, 3, and 4. Because of the paucity of data specifically relevant to the question of what kind of source characteristics are most effective for each of these systems, they will be considered together.

The earlier depiction of System 2 would indicate a negative orientation toward authority sources by its representatives and presumably a negative weighting by them of cues emanating from authority. The results of the studies by Ware and Harvey (1968) and Garso (1969), which have already been mentioned, confirm this assumption. Also in line with this assumption is the finding of Harvey (1964) that System 2 individuals were significantly more influenced by a low status than by a high status source in the number of incorrect descriptions of the slides they accepted, just the opposite of System 1.

The study that found representatives of Systems 1 and 2 to be strongly influenced by the status of the source in their acceptance of falsely depicted slides (Harvey, 1964) also found individuals from Systems 3 and 4 to be only slightly influenced. "The acceptance of false descriptions by System 3 individuals, high under the low authority condition, was only slightly increased under the high authority variation; and System 4 representatives, who accepted a relatively low number of false depictions under the low authority condition, accepted only a fraction more under the high authority treatment" (Harvey, 1964, p. 220).

Another part of the same study suggests that System 3 individuals are more susceptible to peer group than to authority influences. Representatives of each of the four systems, in addition to being asked to identify the contents of the 16 slides, judged the distance between 12 pairs of dots, first in the presence of a falsely calibrated but authentic appearing ruler, and then in the absence of the ruler but with knowledge of the judgments of other members of a temporary triad. Judgments in the social context were made under instructions that either made no reference to conformity or specifically depicted the experiment as one in conformity. As predicted, the degree of social influence, as measured by

the difference between an individual's judgment before and after group discussion, was greatest for System 3 in the condition that made no reference to conformity. While specific reference to the experiment as a study in conformity reduced the social influence only slightly on Systems 1, 3 and 4, it lessened it markedly on representatives of System 2, implying a greater tendency toward negative independence on the part of these last individuals.

Two studies have already been referred to that suggest that while representatives of System 2 may be quite creative when removed from surveillance and probably evaluation by a distrusted authority (Harvey, 1963; Brown & Harvey, 1968) they are likely to be impaired in their performance, through either super-optimal arousal and/or uncontrollable negativism, when their fate is in the hands of an authority they don't trust. Two further pieces of information will be related to this possibility.

The first bit of information was gathered from a study by Adams, Harvey and Heslin (1966) that involved hypnotic induction of different childhood pasts in representatives of each of the four belief systems. Especially relevant to the present point was the finding that representatives of System 2 were far more resistant to hypnosis than representatives of any other system, presumably because of their fear of authority and reluctance to disclose things about themselves that might possibly be used against them by the distrustful hypnotist.

The second bit of information was derived from a study of delinquency by Juers and Harvey (1963). Through use of records, 100 boys who had been committed to a Minnesota State Training School were classified into the four belief systems. As would be expected, a preponderance of original commitments represented Systems 1 and 2 with a few from System 3 and none from System 4. The more striking result was that while Systems 1 and 2 were fairly equally represented in first commitments, approximately 85 per cent of second and subsequent commitments, were accounted for by System 2 boys. This led us to conjecture that the kind of external fate control, rule orientation and punitiveness that tends to characterize state training schools for delinquents might be somewhat effective for changing boys of System 1 but largely ineffective for inducing the sought affects on representatives of System 2. If this is correct, a message is available here on some of the causes and potential cures for the high incidence of current drop-outs from our public schools and other educational establishments.

Some Implications for Educational Media

Whatever relevance belief systems theory may have for educational media, if any, should depend upon the kind of medium, the kind of

material, the message to be communicated and the belief systems, as well as other personality attributes of the recipients. Because of this and my own vast ignorance of the various media, I shall offer only a few simple suggestions inferred from the apparent relationships between belief systems and attitude change noted earlier.

To extrapolate from our theory and data, it would appear that for a "message" to be maximally effective for a representative of System 1 it would need to spring from or apparently be endorsed by an individual of high status, be presented in an authoritative and decisive way with a clear cut, single conclusion drawn, and, where possible, be made to relate to patriotism, morality and the good of yesterday.

Presumably the effective message for a System 2 individual should be cryptic, clever, even cynical, give the implication of being anti-establishment and issue from a source of low status and high expertise.

A representative of System 3 would probably be influenced positively by a communication that provided more than one side to an issue, came from a source of either high status-high expertise or low status-low expertise, and suggested its relationship to togetherness, fellowship and aid to the underdog.

The representative of System 4 could be positively influenced by a wider variety of communications than persons of any of the other systems owing to his greater concern with *what* is being communicated than who is communicating. Perhaps he would be maximally influenced by the approach that was novel, provided several alternatives with a great deal of evidence for each and which only offered suggestions for multiple conclusions instead of spelling out one decisively.

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Social Learning Theory and the Design of Instructional Systems

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The designer of instructional systems which deal with affect has access to many psychological theories and research evidence as to how emotions are learned and expressed. Awareness and application of these theories and empirical findings can be helpful to the educator who is attempting to create and design educational material. These theories represent different emphases, and vary in the amount of influence they have exerted in the field of education.

Affective Learning

Learning and development theories are often concerned with the acquisition of affective behavior in children. For example, the theories of Freud, Gesell and Piaget are representative of the view that children pass through a sequence of stages of emotional development which is, in part, predetermined by the inherent nature of the organism. The usual implication is that all children pass through these stages in a relatively fixed sequence, and are unable to progress to the next highest level of affective learnings until they have integrated previous learnings.

Another theory holds that some feeling states, particularly anger and aggression, are learned in response to frustration. Many experimental studies have been conducted to investigate the possible effects of frustration on emotional and intellectual behavior. Proponents of this view

often attribute affective outcomes such as destructiveness and aggression to the presence of frustration within the child.

Still another well known theory holds that behavior is learned because that particular mode of behavior has been reinforced. It is frequently pointed out that such reinforcement for this behavior usually comes from another person. For example, in the case of the young child, affective behavior is thought to be learned through reinforcement from parents.

All of these well-published theories have implications for the designer of instructional systems. In addition, one emerging psychological theory which should have great impact in the field of education is known as social learning theory. Social learning theory is concerned with the learning that occurs simply through observing other people. That is, if the observer subsequently behaves, in an affective fashion for example, similarly to the people he has observed, it can be hypothesized that he has learned affective behavior through imitation. It is important to note that this explanation does not *require* the concept of reinforcement as a necessary condition. Therefore, this theory often stands in marked contrast to the operant conditioning analysis of behavior.

To date, social learning theory has not had substantial influence on the design of instructional systems. It is particularly well-suited to forms of educational media. Application shows (1) it can result in the rapid acquisition of complex behaviors, particularly affective behaviors; (2) mediated presentations are as effective, and considerably more efficient than live demonstrations; and (3) many learnings can be taught to relatively passive learners, a situation similar to the typical classroom situation. Although considerable experimental research has been directed to identifying the optimal conditions under which behavior is acquired through the observation of another person, it remains for the instructional technologist to translate these results into the design of an educational system. This translation, however, is a relatively simple task, once the basic tenets of the theory are understood.

Social Learning Theory

Basically, social learning theory attempts to account for the learnings, both cognitive and affective, which occur through observing others. The exact mechanisms by which these behaviors are learned are yet to be subjected to experimental verification. The fact that such learning does take place, however, has been well established experimentally. Because the exact mechanisms are still somewhat obscure, the social learning theorists often use the technical phrase "modeling" rather than "imitation," for imitation connotes conscious intent.*

*The terms will be used interchangeably in this paper.

Already, there are considerable results from existing research in this field which will aid the educator in designing situations from which learners can acquire certain types of behavior. Future research promises to investigate the exact processes in the relationship between the stimulus situation and observed responses, so that ultimately we will be able to effect even greater control of the designed stimulus situation. Nevertheless, existing findings are quite adequate to exert a substantial influence on the design of instructional systems if appropriately applied.

Experimental Investigations

The purpose of this section is to investigate representative research and to suggest ways of applying the results.

Many kinds of affective and cognitive learnings can be investigated through Social Learning Theory. One emotional pattern that has been extensively studied by Social Learning Theorists, as well as other theorists, is the learnings associated with the expression of aggression. In initial experimental investigations, one prerequisite was that the emotion to be studied had to be easily observable, and the outward overt expression of the feeling of aggression was selected because it could be very easily observed. For this reason, a series of experimental studies were centered around the concept that a normal unfrustrated child has the potential for and probably will be aggressive after simply watching another person act aggressively. Direct rewards were not felt to be essential for insuring imitative or matching aggressive responses.

Some of the earliest experiments were conducted by Bandura who worked with nursery school children. (Bandura, et al., 1961, 1963). A typical study involved having one group of children watch models engage in aggressive acts, while other children, randomly assigned to another group, observed nonaggressive models. All children were then taken individually to a room similar to where the models had performed. The children could then be observed to determine whether they would spontaneously imitate the model's behavior or whether they would do something different. It was repeatedly found that children who had been exposed to an aggressive model subsequently produced a significantly larger number of aggressive responses. The exact form of aggression was often very similar to that which they had seen demonstrated by the model. For example, if the model had hit the Bo-bo doll with a mallet, the children who had observed this were often seen to hit the Bo-bo doll with a mallet.

General conclusions from this type of experiment suggested that children can learn aggressive (one category of affective) responses, by observing other people who demonstrate these responses in their behavior.

A series of experiments were conducted to investigate various

situational conditions which may result in overtly aggressive behavior. These experiments attempted to answer such questions as, what is the effect of observing a model who is filmed rather than being present in the same room? What effects do the conditions of reward and punishment have on the learning of affective behavior? Some of the resultant literature suggests that the method by which the presentation of the stimulating situation is mediated is relatively unimportant. Imitative aggressive behavior in children has been noted, not only in situations in which the child has observed a live person being aggressive, but also when observing a filmed person being aggressive, or even a cartoon character being aggressive. (Bandura, et al., 1963a).

When the model being observed by the child was punished for acting aggressively, only a few children spontaneously acted aggressively when subsequently given the opportunity. (Bandura, 1965; Walters and Park, 1964). The question could then be raised as to whether the rest of these children had really "learned" the aggressive behavior since they did not display it. By contrast, it was consistently observed that if the model was rewarded for being aggressive, many children would spontaneously imitate that aggressiveness, and furthermore, would behave aggressively for a long period of time. Thus, punishment *appeared* to decrease learning, and reward *appeared* to increase learning. To test this, an experiment was conducted in which the experimenter promised to reward children who had observed the punished model if they would imitate what the punished model had done. Those who had originally seen the model punished but had failed to imitate him, then showed as many imitative aggressive behaviors as the group who had watched the rewarded model. This suggested that the children *had* "learned" the punished aggressive responses and had stored them. Although they had not originally exhibited them, these learnings were available to the child when the situations for imitating them were more opportune. (Bandura, 1965).

Limited experimentation has also been done with modeling of other emotions. For example, there is some indication that preschool children are more likely to imitate a helpful affectionate model, than an aloof, impersonal one. (Bandura, 1961).

Although studies involving the production of overt aggression in children have been more widely publicized because of their dramatic import, the production of other types of affective and cognitive behavior have also been effectively produced by experiments resulting from Social Learning Theorists. For example, decision making processes involved in the making of moral judgments often contain components of both affective and cognitive behavior.

One experiment was designed to explore whether moral judgments in children could be influenced and altered by presenting models who gave

a moral judgment opposite from that of the child's. Children were divided into two groups. The division depended on responses to stories designed to assess their moral orientation. Children placed in one group had tended to make judgments in terms of "objective responsibility," that is, they usually judged conduct in terms of the amount of material damage resulting from it. Children in the other group had usually judged acts by the degree of "subjective responsibility," that is, in terms of the intentions of the actor rather than by material consequences. These two groups of children were then exposed to behavior of a model who exhibited the *opposite* judgmental framework from the child's.

Three conditions were structured for each group: In one condition, the children observed models who expressed moral judgments which were counter to that the child had expressed, but no reinforcement was received for matching the model's behavior. In the second condition, the children observed models who expressed moral judgments which were counter to theirs, and in addition, the children were then positively reinforced for any adoption of the model's opposite type of response. In the third condition, there was no exposure to any models, but the child was reinforced whenever he expressed *any* moral judgment opposite to that that was dominant for him.

Operant conditioning, by itself, was found to produce only a slight increase in change of moral judgments. But, provision of models alone, or of models plus reinforcement, were equally effective in significantly shifting the children's judgmental decisions to the opposite type. (Bandura and McDonald, 1963). Judgmental decision making as described above, involved not only affective, but also cognitive components. Thus, Social Learning theory can be seen to be applicable to a variety of types of behaviors.

As a result of these kinds of experiments with children, initial attempts have been made to translate the theory into instructional systems for young adults. For instance, one continuing problem of education is the exposure of student interns to a variety of desirable teaching techniques in such a manner that the interns will be able to effectively emulate such techniques. In a typical experiment designed to study this problem, a teacher intern would observe a videotape model performing a specific teaching behavior, for example, asking higher order questions (a question which involved some integration of knowledge on the part of the pupil rather than a simple "yes" or "no" response.) After exposure to the model, the trainee was instructed to teach a lesson attempting the same class of behaviors which he had observed. This presented the intern with a far more difficult task than the simple imitation exhibited by small children, because the behavior he had observed could not be literally imitated. The teacher intern never taught exactly the same lesson

as the model. He had to observe, interpret, and apply the model of behavior to a similar, new situation. After observing the videotaped model, the teacher intern then selected a topic for his own lesson, organized it in the way he preferred, and taught the lesson in his own style. Thus, if he had observed a model asking a specific level of questions, such as evaluative questions, he then had to construct similar questions on an entirely different topic, and ask them of different students who might respond, but not in exactly the same way that the students in the demonstration had responded. Under these conditions, requiring transfer, modeling effects are often observed to occur. Significant learning of the desired teaching behavior was exhibited, although on a lesser degree than when responses could be literally imitated. (McDonald and Allen, 1967).

One significant piece of information for future designers of similar instructional systems became very apparent during these studies. This was the importance of clearly signaling to the learner exactly what the desired behavior was which was to be imitated. If we think of the observer as an information processing system with definite limits on his ability to process multiple types of information, then the advantage clearly cuing the observer to the behaviors which are to be imitated can be seen. A subsequent experiment demonstrated that the addition of cuing or signaling cues during the time the teacher intern is observing the model will significantly influence the learning of the intern. (Claus, 1968).

Facilitating Conditions

These studies and others similar to them indicate that many different kinds of behavior, simple and complex, affective and cognitive, can be learned by observation. Social learning theorists assume from this that a substantial proportion of behavior is learned by observing, and by observation alone. However, several conditions have been found to enhance the acquisition of behavior that is learned by observing:

1) *Utilizing the motivational system of the learner.* If the learner comes to the observation of a model with motivational predispositions, the designer of an experiment or an educational system can then arrange the conditions to be observed so that they will arouse motivations already present in the learner. An example of this was a study of preschool children in which the aggressive model succeeded in capturing all the available toys in a playroom from another child. When the observing children were later questioned as to which person they would like to be

like, many stated they would like to be like "Rocky," the aggressor. A typical answer was that "Rocky had got all the toys." In this case the authors had assumed that the children were motivated to acquire toys. Observation of the model demonstrated that one way to get the toys was by being aggressive. Thus the situation had been arranged to arouse the motivational system already present in the observers. (Bandura, et al., 1963c)

2) *Reinforcement.* Although learning in the affective and cognitive realms can take place through observation alone, and thus is independent of reinforcement, it has been found that either actual or inferred reward of the model will facilitate acquisition of imitative learning. In some of the experiments the learner had observed the model being rewarded; in others, the learner had been able to infer that the portrayed behavior will be rewarded. There is also some evidence to indicate that a learner can learn to administer rewards and punishments to himself in the same way that a model has rewarded or punished himself for responses. (Bandura and Kipuras, 1964; Bandura and Whalan, 1968). Reinforcement and reward are also helpful in maintaining the behavior. The general principle here is that modeling facilitates acquisition of behavior, and reinforcement facilitates retention of that behavior.

3) *Practice and Rehearsal.* The social learning studies make it clear that practice or overt rehearsal is *not* a primary factor in the acquisition of behavior. Provided that the learner has the response capacity, responses will be acquired with no observable practice, although we generally assume that some covert rehearsal may be occuring. However, practice may exert a facilitating effect in some instances. An example of when overt rehearsal may be helpful or necessary in acquiring responses occurs when the learner must develop the capacities of two sensory systems so that they will operate in an integrated manner, as in the learning of a new and complex visual motor activity. But when the responses are already available, and are simply to be integrated into a new pattern, or when components of the responses are already learned and available, overt rehearsal is usually not required.

Directions of Future Research

There are two major conceptions of the process which may be intervening between the stimulus input situation and the observed outcome

response. The first of these is known as contiguity theory, the second as mediational theory. Both of these theories attempt to construct a possible "link" between the observable actions of the model (the stimuli) and the reproduced action of the observer, (the response). It is thought that this "link" may be some type of non-observable representations of the model's action within the system of the learner. These could theoretically be stored within the learners' information processing system and be recalled subsequently, thus acting as stimuli which direct the learners' resultant actions. Therefore, these representations could form the basis for the resultant imitations of the original act which the learner had observed.

The contiguity explanation stresses the importance of temporal juxtaposition of stimulus and response, holding that learning will occur whether reinforcement is given or not. Since we know that imitation or modeling effects do occur without the presence of reinforcements, contiguity theory supplies one possible rationale for this observed behavior.

In the mediation explanation, the "link" between the subject's observation of the model and his own subsequent behavior is thought to be symbolized in the form of images or words. Either of these forms of symbolic representation are then thought to possess stimulus qualities. For example, there is some evidence which indicates that children who generate verbal descriptions of the modeling stimuli, will then produce significantly more matching or imitative responses than children who simply observe the modeling behavior without generating verbal descriptions. (Bandura, et al., 1965). While both of these theories attempt to account for the basic phenomena in modeling behavior by introducing the construct of intervening responses which "store" the model's behavior, and which subsequently act as stimuli which elicit imitations of the model's behavior, neither theory has been extensively tested to determine whether one or the other has greater explanatory value for accounting for modeling affects. When such information does become available, greater control of the stimulus situation will then be available to the educational technologist.

Applications to Educational Design

Present social learning theory has many potential applications to educational technology and to instruction. The results of research on observational learning may be applied in a similar fashion regardless of whether one accepts a contiguity theory explanation, or a mediational theory explanation to account for the effects of learning from observing.

The research in social learning theory suggests that maximal learning will occur under the following conditions:

1) If the behavior to be modeled can be observed,
2) If the cues to be imitated are clearly indicated to the observer or if the observer verbally expresses the cues which he perceives as important,
3) When the acquisition of an observed behavior can be shown to have actual or potential reinforcing consequences for the learner,
4) When reinforcement and/or feedback is actually provided for appropriate imitation,
5) When provision is made for a practice phase.

How can these experimental findings be translated to the design of an educational system? Decisions involved in the application of theory to practice involve:

1) *Analysis of Desired Behavior.* When the modeling paradigm is applied to instruction, a complete behavioral analysis of what is to be learned is essential. Though this suggestion will be readily accepted, the necessity for analysis prior to developing models cannot be stressed too strongly. The designer must describe the behavior to be learned in terms of observable responses, that is, he must plan to create an actual visual portrayal of the behavior. This description is different than the usual description of behavioral goals, it is the difference between describing how teachers should reward their students for participating in class discussions, and actually showing a teacher enacting this behavior. There are two main ways in which this modeling demonstration can be arranged: a) the model can simply portray a sequence of behavior; or b) the model can respond selectively to different stimuli. In the latter case, the behavior portrayed should be linked to specific cues by a reward and punishment system. The learner then learns both the responses and the discrimination.

2) *Portraying behavior.* The second step is involved with decisions as to how to portray the behavior to be learned, i.e., the stimulus input. The designer will base his decisions on such factors as:

a) his perception of the need-motivational system of the learner,
b) his analysis of the essential cues or signals to be shown to the observer,
c) how and when to portray the reward consequences.

Thus, the designer makes decisions about how to develop a model which makes the behavior to be learned easily observed, and also, how to portray the rewarding consequences of adopting the behavior. Precise control should be maintained over the stimulus input in relation to the learner's information process capacities. As the behavior to be learned changes from relatively simple performances to more complex behaviors, control over the stimulus input becomes more and more critical.

3) *Provision for practice and reinforcement.* Provision for practice

and reinforcement, although not an absolutely necessary condition for acquisition of behavior, is crucial for optimizing acquisition of the behavior and enhancing the retention of the behavior to be acquired. Reinforcement can be overt or covert, that is, implied. It should be remembered that situations can also be structured so that the learner reinforces himself rather than being dependent on an outside agent for reinforcement.

4) *Instrumenting the system.* Once the system is designed, the technical problem of instrumenting the system occurs. The know-how for these problems is readily available.

Instructional Paradigms

Three main paradigms have been utilized in the research on social learning and should also be useful for design of instructional system. These relate to the behavior of the learner and are:

1) **OBSERVE MODEL** **REPRODUCE MODEL'S BEHAVIOR**

This paradigm may be expanded as follows:

2) **OBSERVE MODEL** **REPRODUCE MODEL'S BEHAVIOR** **RECEIVE REINFORCEMENT**

When paradigm (1) is used as the base for an instructional design, the rewarding consequences of imitating the model may be inferrable or demonstrated, but when paradigm (2) is used, actual rewards for imitating are given.

3) With a slight modification, these paradigms may be combined into a feedback system which is an information-processing model of an instructional system:

PHASE 1
Stimulus Input
OBSERVER MODEL

PHASE 2
Response
REPRODUCE MODEL'S BEHAVIOR

PHASE 3
Feedback
RECEIVE REINFORCEMENT

Rewards for imitating
Information on deviation from model's behavior

The system becomes a cybernetic one by cycling the learner through it: Observe - rehearse - receive feedback - observe - rehearse .... The learner is taken out of the system when his behavioral reproductions reach a pre-established criterion performance.

This more complex system gives the instructional designer greater control over the behavior modification process. Providing for rehearsal gives the designer test points for checking the acquisition of the desired behavior change. These checkpoints are not only necessary to evaluate the learning but also to provide the learner with practice which is particularly useful when complex behavior is being learned. The feedback component also guarantees that imitating the model has reinforcing consequences, and also may provide additional information to the learner.

Research on this latter training paradigm shows that cueing the learners on the behavior to be learned during the modeling phase reduces the need for cueing during the feedback phase (Claus, 1968). Discriminative training during the feedback session in addition to providing rewards, is more effective than only providing rewards for imitating. (McDonald & Allen, 1967). The paradigm may be varied in many different ways as research on its components and combinations suggest ways to optimize instructional systems designed from it.

Potential Areas for Application

Social Learning Theory is particularly applicable to situations where the designer wishes to keep traditional lecture presentations to a minimum. The model does not need to *tell* the students the procedures for coping with a situation, rather he *demonstrates* successful coping tactics. This makes the technique particularly applicable to areas dealing with affect, such as the complex behaviors involved in inter-personal interactions.

Typical examples of potential areas for application might be the affective and cognitive interactions involved in training teachers, in teaching creative problem solving behavior, and in teaching students to successfully interact with peers, adults, and administrators.

In addition, modeling effective decision making in both cognitive and affective areas should be easily possible both in relation to decisions about problems experienced with others, as well as decisions in relation to self-awareness and self-enhancement.

Standardized presentations are possible under the application of this theoretical system because it is admirably suited to mediated presentations to learners. The advantage of an instructional system which can utilize mediated learning presentations is the experimental potential which they present. The exact replicability thus possible yields attendant opportunities for objective analysis, and revision, as well as utility with multiple types of selected subjects. In addition, successful coping behaviors can be modeled to large numbers of relatively passive observers

(a typical classroom situation) with the reasonably confident expectancy that this behavior can subsequently be replicated by observers.

Summary

Social learning theory, as a formal psychological theory, accounts for the learning that occurs by observing. This theory holds that affective and cognitive behaviors are sets of responses which can be acquired through observation. The experimental literature is rich with studies that demonstrate this. At the present time, there has been only minimal application of this theory to instructional techniques. Knowledge for instrumentation of instructional systems is readily available. Social learning provides paradigms useful in solving problems of the basic design of the system itself. All that remains is more extensive applications of these paradigms to a broad range of instructional problems.

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Attitude Measurement

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It is the purpose of this paper to introduce educational media technologists to the field of attitude measurement–why it is important, some of the difficulties in measuring attitudes, some methods of gathering data, particularly through the use of attitude scales, and some of the common concepts in the area.

The measurement of attitudes within the educational setting is becoming an increasingly important component of evaluating both new and on-going instructional programs. As our knowledge about the interaction between attitudes and other psychological processes such as perceiving, remembering, learning, and reasoning increases, it becomes apparent that we need to assess the affective behavior of students as well as their cognitive behavior.

A student's attitude toward a given course or subject area can be a contributing factor toward his achievement in it. But we are not concerned with academic achievement alone, even though a student does not show superior accomplishment in a given area, the development of a more favorable attitude toward the subject matter is a desirable end in itself. There are many instances in which instructors attempt to influence the attitudes of their students toward a subject matter area, but rarely is an attempt made to measure the effects of these efforts. One such instance is in the teaching of science, where a teacher hopes to promote favorable attitudes toward the scientific method of solving problems. This objective is not necessarily related to the achievement of the students. Even a student with a relatively low degree of achievement

may have developed a strongly favorable attitude toward the scientific method.

In the humanities there is present at least the implicit objective of developing favorable attitudes toward literature, the arts and music. Achievement tests do not necessarily reflect the degree to which a good teacher has been instrumental in developing these attitudes. But if areas of affective learning as distinguished from the acquisition of specific content are recognized as important, there should be some effort made to measure them along with achievement.

The educational technologist is often called upon to furnish materials that will enhance interest and provide learning experiences that cannot be offered through regular classroom activities. In so doing, he is directly involved with the promotion of favorable attitudes toward the subject area. He may find it of value to assess the effectiveness of his materials on the attitudes of the students, whether toward the materials themselves, or toward the subject area in which they were used. Measures of students' attitudes toward a program as conventionally taught and as supplemented through the use of educational media may also be helpful in assessing the relative value of the two methods.

Media presentations in themselves represent an important means of influencing attitude learning, or implementing attitude change in the larger social context. That media presentations may be used effectively to influence a change in children's attitudes has been shown in a number of research studies. Thurstone (1933) investigated the effects of a number of motion pictures on the attitudes of children. The children's attitudes were first measured, then they were shown a film chosen to influence their attitudes toward nationality, race, war, crime or the punishment of criminals. Attitudes were again measured, either the day after the film was shown, or several weeks or months following exposure. The results consistently showed that the films had a significant effect on the children's attitudes toward social issues. There was also some evidence that repeated exposure to a single film led to greater attitude change, and that younger children were more influenced than older children.

When a media technologist is involved in the selection or design of a program with the goal of changing attitudes toward some topic, issue or concept, it is necessary for him to be familiar with techniques of attitude measurement in order to provide an empirical assessment of the effects of his materials. Before discussing specific measurement techniques, however, it is of value to consider what it is that we are trying to measure and some of the difficulties inherent in the process.

The concept of attitude has existed in psychological circles for a long time; in 1935 it was possible for Gordon Allport to state that "the concept of attitude is probably the most distinctive and indispensable

concept in contemporary American social psychology. No other appears more frequently in experimental and theoretical literature." Except for a brief decline in the 1950's, Allport's statement could have been made with equal veracity in any of the ensuing years.

The vast literature concerning attitudes reports on a wide range of topics, from experimental studies comparing the attitudes of two or more groups, or investigating the variables affecting attitude change, to the consideration of theoretical issues such as the nature of attitudes, their relationship to other cognitive processes and personality traits, and their distinction from related concepts such as beliefs and opinions.

It is not our purpose here to delve into the conceptual elaborations of theoreticians over the past forty years. Although a great deal of discussion has taken place over the definition of attitudes, Thurstone's (1946) early definition of attitude as "the degree of positive or negative affect associated with some psychological object." "Psychological object" is simply a generic term for any concept, issue, institution, ideal, person or group toward which individuals may have positive or negative feelings. A particular occupation, university president, political ideology, racial group, or labor union are all psychological objects. So also are concepts such as freedom of speech, and issues such as the war in Viet Nam, integration, and inflation.

The basic dimensions of attitudes which we attempt to measure are included in Thurstone's definition. These are the direction—either positive or negative, favorable or unfavorable—of an individual's feelings toward a psychological object, and the magnitude of that feeling. It is often not enough to know only whether a person is positively or negatively inclined toward something; we need to have more precise information as to the extent of his feelings.

An analogous situation exists in other areas of measurement. It would, for instance, be possible to classify individuals in terms of whether they are above average, below average, or average in height. It would be much more useful, however, to specify an individual's height more accurately. Among these individuals who are above average in heights, there are obviously individual differences that are of some significance, particularly to a basketball coach. To know that an individual is above average in intelligence is useful information, but much more useful information is provided if we know the degree to which an individual is above average in intelligence. A person with an IQ of 110 and one with an IQ of 170 are both above average in intelligence, but the latter is considerably above average whereas the former is not.

Insofar as a person's attitudes predispose him to action in certain situations, we might expect that stronger attitudes would provide more motivation to act than would only slightly favorable or unfavorable

attitudes. Even though attitudes alone do not determine whether an individual will act, they are a contributing factor, and as such can be used as one index in attempting to predict behavior.

When our interest is in changing attitudes, a more precise determination of both initial and post-treatment attitudes yields more accurate data as to the effects of an instructional program.

The measurement of attitudes may be contrasted with the measurement of directly observable variables. It is not difficult to measure individual differences in a variable such as reaction time. A stimulus is presented and the time required for an individual to make a given response is measured accurately. The time of reaction is directly observable, and the measurement task consists of recording the observations. However, if an individual refers to a police officer as a "pig," what is observed is a statement made by the individual with respect to another person. The observed statement is not the attitude. We might certainly infer that this individual has negative feelings or an unfavorable attitude toward policemen, but we have not observed the feeling or the dislike. A child who says that he hates algebra is primarily giving an expression of how he feels about algebra. We do not observe his feelings, however, only what he says, and our measurement task is much more difficult than that involved in recording observations of reaction time.

As a first step in assessing attitudes, then, we want to observe behavior that we assume has relevance to the subject in which we are interested. It may be possible to find some situations in which spontaneously emitted behavior would serve as an indicator of underlying attitudes. The Viet Nam War is obviously an issue which elicits intense emotional reaction in many individuals. What is said about this war can be observed, as can other behaviors related to it, such as picketing, marching, contributing funds, etc. We would probably be correct in inferring that persons engaged in these activities have strongly unfavorable attitudes toward the war.

Aside from the impracticality of an investigator having to wait for spontaneous behavior to occur and then being present to record it, this method of assessing attitudes usually does not yield information about individuals with less extreme feelings. Also, as mentioned above, attitudes are only one determinant of overt behavior, and persons with equally extreme views may desist from action for a number of reasons. Observation of spontaneous behavior leaves, of course, unanswered the question of what attitude those who do not engage in overt behavior have toward some object.

A closely related approach to assessing attitudes is to use group membership as an indication of feelings toward some object or concept. Some groups are formed on the basis of specific issues—to fight water

pollution, promote safety laws, protest the war in Viet Nam. We could probably infer that members of the Communist Party were favorably disposed toward communism, with our erroneous classifications consisting of a number of FBI agents. But membership in other groups is of a more nebulous status: joining a labor union may be compulsory in order to hold a job and does not necessarily mean that members have favorable attitudes toward labor unions. In addition, group membership as an indicator of attitudes allows only a gross classification of people into groups.

Because of the difficulties inherent in assessing attitudes by observing overt actions, or by inference from group membership, the majority of evaluation efforts have depended on some form of verbal response. A method often used is that of the survey or interview: individuals are asked direct questions concerning their feelings or opinions about a certain issue, object, etc.: whether they are for or against it, like or dislike it, or approve or disapprove of it. When a large number of persons is involved, as in public opinion surveys of attitudes toward social, economic or political issues, a sample of individuals who are representative of the larger population is surveyed. Various methods have been derived for identifying a cross-section of the population that will be truly representative—an important consideration to insure that no systematic biases are present in the results that would lead to erroneous generalizations about the views of the larger population. Discussions of sampling techniques may be found in Selltiz *et al.* (1966) and Scott and Wertheimer (1962).

Questions asked in a survey may be either open-ended (e.g., "How do you feel about the draft?") where the respondent answers in his own words and the interviewer records the information verbatim, or closed, where the individual is furnished with a set of response categories and indicates the alternative most closely aligned with his feelings.

There are advantages and disadvantages to both types of questions. Open-ended questions permit the respondent to answer in his own frame of reference, giving a more detailed picture of his views, which may aid the investigator in discovering attitudes that had not been anticipated *a priori*, or in avoiding misinterpretation. The procedure is, however, time consuming for both the interviewer, who must record the answers, and the coder, who must describe the data obtained in a systematic and objective manner. A content analysis procedure is usually required, using well-defined categories into which responses are coded, then tabulated.

In contrast, closed questions are easy to administer and relatively quick to analyze. Respondents must answer on the dimension of interest to the investigator, thus limiting the number of uncodable answers. However, with closed questions, there is a greater likelihood that any

misinterpretation of questions would pass unnoticed. Also, respondents may choose an alternative even though they have no clearly formulated views on the question; the presence of responses suggests an alternative to them.

It is possible, of course, to combine the two types of questions, drawing from the strengths of each. One may conduct a small pilot study using open-ended questions to serve as the basis for constructing categories of response to closed question in the larger study. Using this procedure, an investigator is more likely to include the entire range of possible responses to his questions. The data obtained from the pilot study might also aid in the clarification of issues, the formulation of new questions and hypotheses, and the identification of factors relevant to the topic which are salient for individuals. It is also possible to combine the questions by asking respondents to indicate their feelings on a fixed-alternative question, such as "Did you enjoy watching the film about children living in Appalachia?: (Yes or No)," and following their answer with an open-ended question such as "Why?".

Those readers desiring more information on the construction and implementation of surveys or interviews are referred to Selltiz *et al.* (1966), Payne (1951) and Oppenheim (1966). These authors discuss question-types, sequencing of questions, question wording, and various issues related to gathering data through surveys or interviews. In addition, Cannell and Kahn (1968) give an excellent presentation on interviewing which includes discussions of sources of bias, methodological considerations, question design, interviewing techniques, etc.

A consideration which must be kept in mind when asking individuals direct questions of any kind is that respondents may be reluctant to express their feelings publicly. If the person feels that an honest expression of his feelings may place him in unfavorable light, or if he is motivated to present himself as favorably as possible (or, in some situations, as unfavorably as possible) we may not be able to rely on his verbal reports. One cannot expect complete honesty or freedom of expression regarding an employee's thoughts or feelings about his employer if the employer asks the questions or is present when they are asked. Similarly, a teacher who attempts to assess how students feel about various aspects of his course cannot expect complete honesty and frankness if the students believe that the attitudes they express may have some influence on the grade they receive.

One possible way of reducing respondents' anxiety about expressing their views publicly is to administer a written questionnaire. Essentially, the same questions may be asked as in an interview or survey, but subjects can be assured of anonymity if the investigator so wishes. In addition, questionnaires may be administered to large groups of people

simultaneously, thus being less time-consuming and probably less expensive than a survey, while obtaining information from more people. There is more uniformity from one measurement situation to another when using questionnaires, because of their impersonal nature and standardized format. The personality of the interviewer does not influence the respondent, and there is more uniformity between measurement situations. One other advantage of the questionnaire is that the respondent may take more time to deliberate on his responses than when he is under the social pressure to respond to verbal questions.

In using questionnaires, however, one loses the inherent flexibility of an interview: there is little opportunity to identify a misinterpreted question or an unclear answer. When the questions to be asked are open-ended, respondents will usually speak more fully than they will write; an interview might, then, yield more detailed information, although interviewers faced with overly verbose individuals may view this as a dubious advantage.

More detailed comparisons of interviews and questionnaires may be found in the references cited above for interviews. These authors, with the exception of Cannell and Kahn, also address themselves to the issues specific to questionnaire design.

Because there is less opportunity to clarify questions which respondents may not understand, an investigator, perhaps, must pay greater attention to question design when constructing a questionnaire. But regardless of the mode of inquiry, the formulation of appropriate questions is of primary importance, and involves a considerable amount of skill. Questions should be brief, clear, unambiguous and direct.

For example, in the question, "Do you think there should be an international scientific holiday?", the topic might be interpreted by some individuals to mean a day on which science is to be commemorated. and by other individuals as a period during which the world is to enjoy a respite from further scientific inquiry.

Problems arising from differences in frames of reference between investigators and respondents are well illustrated by an example cited in Cannell and Kahn (1968). The Bureau of the Census found that questions aimed at determining the size of the labor market consistently underestimated the number of employed persons. When respondents were asked, "Did you do any work for pay or profit last week," they answered in terms of their major activity, ignoring the explicit phrase "for pay or profit." Thus, housewives and college students answered negatively even if they were employed part time. When the questions were revised to allow people to classify their major activity first and then to indicate any supplemental work for pay, the official estimate of employment rose by more than a million persons.

Further considerations involved in question formulation are covered in depth by Cannell and Kahn (1968). Although the focus of their discussion is on interviewing, questionnaire developers will also find the topics of primary importance. The authors consider (1) the cognitive factors of language, frame of reference, conceptual level and the importance of using questions which embody a single idea, (2) the accessibility issue—dealing with the respondent's possession of relevant information and background experiences, and (3) motivational factors, which may influence the respondent's willingness to cooperate.

The methods of assessing attitudes considered thus far in this paper have progressed in the degree of preciseness which they afford a researcher. We began with the observation of spontaneous behavior, including the special case of group membership, where the investigator makes no attempt to present a standardized stimulus condition nor to control the situational variables. He merely records behavior that he observes and has no way of identifying the attitudes of persons who do not engage in overt action. There is also little opportunity to measure the degree of favorableness or unfavorableness of attitudes; individuals usually must be grouped into gross categories.

The use of verbal reports to assess attitudes was introduced through the survey or interview technique. Here, a group of individuals whose attitudes we wish to assess may be first identified, then presented with a more-or-less standardized set of questions concerning the concept(s) or issues in which we are interested. There is a greater likelihood that individuals whose attitudes lie along the continuum from favorable to unfavorable will be included for study. We may be able to gain information on the salient factors which are relevant to individual feelings. Although survey data is often reported in terms of gross categories of response (e.g., for or against, favorable or unfavorable), some attempt may be made to determine degrees of difference: such an attempt is likely to be relatively imprecise from a technical viewpoint, however.

The construction of a questionnaire represents a further increase in the amount of control which the investigator exerts over the measurement situation. Questions are presented in a standardized format, and there is little opportunity for the personality of the researcher to influence responses. Depending on the purpose of his query, the investigator may not be willing to relinquish the more detailed information offered by an interview for the more standardized questionnaire. But from a measurement viewpoint, the latter technique will produce data that is easier to analyze and more comparable between respondents.

A growing need for objective measurement instruments that could be administered to large groups of people has led to the development of attitude scaling techniques. Technically superior to questionnaires, atti-

tude scales provide a quantitative method for assessing an individual's relative position along a unidimensional attitude continuum. The direction and intensity of the respondent's attitude is indicated by a single score which summarizes his responses to a series of items, each of which is related to the single concept, object, or issue under study.

The procedures followed in the construction and use of attitude scales makes them similar to psychological tests of aptitude and achievement. Before describing specific attitude scaling techniques, therefore, it might be useful to briefly discuss the nature of more familiar tests. We can then compare some of the differences and similarities between tests and scales.

The items on aptitude and achievement tests are carefully edited and selected in accordance with specified criteria. As opposed to questionnaires, where the answers to specific items are often of interest, so that single item scores are tallied separate items.

The items should, of course, be relevant to the particular aptitude or type of achievement being measured. A test designed to measure the accuracy and speed with which individuals can add numbers obviously should not include questions relevant to the calculus. A fundamental assumption guiding the selection of aptitude test items is that those individuals with a high degree of the aptitude are more likely to give the correct response than those with a low degree of the aptitude.

The tests are administered under standardized or controlled conditions. Individuals are aware that there are correct answers to the items and that they will be judged or evaluated in terms of the number of correct answers that they give. Most respondents are presumably motivated to perform well, although it is possible to purposefully mark wrong answers in order to obtain a low score. A genius, for example, may portray himself as a moron if he so desires, but it is impossible for a moron to portray himself as a genius on an ability test, regardless of how highly motivated he may be to do so.

Attitude scales are both similar to and different from aptitude, achievement, and other tests. The items in an attitude scale are also carefully edited and selected according to specified criteria, which we will discuss below. The items in an attitude scale should also be relevant to the single concept or object that the scale was designed to measure. For example, an attitude scale designed to measure attitudes toward the draft should contain only those items that are clearly relevant to this topic and exclude those that are irrelevant.

The major difference between a scale and a test is that individuals taking a scale respond in terms of their feelings about individual statements and there are no single "correct" answers. The respondents' beliefs, opinions or feelings provide the criteria by which he judges the

"correct" answer. If a scale is designed to measure attitudes toward censorship, for example, individual responses of either "Agree" or "Disagree" to the statement, "Strong censorship laws are a necessity" will be correct, depending on the attitude of the respective respondents. Consequently, whereas someone taking an achievement or aptitude test may purposefully lower, but not raise, his score, it is possible for a respondent on an attitude scale to fake his feelings in either a positive or negative direction. This possibility exists not only on attitude scales, but whenever we attempt to infer feelings from verbal reports.

Many of the criteria for writing good questions for interviews or questionnaires also apply to the statements on attitude scales. They should be clear, brief, and unambiguous, containing only one complete thought, stated in a simple rather than a compound sentence whenever possible. Edwards (1957) summarizes other informal criteria for writing statements. Because the purpose of an attitude scale is to differentiate between varying intensities of attitudes, items must be included that reflect the entire range of feelings from strongly favorable, through neutral, to strongly unfavorable toward the topic being measured. To ensure adequate coverage of this continuum, scale developers often collect relevant statements from published materials, or from personal interviews.

If a statement is equally likely to be endorsed by persons with favorable and unfavorable attitudes, then it obviously will not be of value in differentiating between the groups and should not be included on the scale. The likelihood that factual knowledge about a concept, object or issue will be equally available to all individuals precludes the use of factual statements on an attitude scale: individuals would tend to agree with the items irrespective of their attitudes.

The criteria considered thus far for writing attitude scale statements are largely informal. Producing good items depends largely on the skill and intuition of the writer—a situation similar to that of designing a survey or questionnaire. But one of the major contributions of scaling techniques to the assessment of attitudes is the inclusion of objective procedures for choosing discriminating items for the final scale from among a large pool of items originally gathered. The particular method followed in choosing final scale items varies with different scaling techniques, and reliably differentiate between the attitudes of respondents.

The two major approaches to the construction of attitude scales are discussed below. But it may be of value to first examine the extent of topics for which scales have been designed.

An extensive collection of attitude scales that have been constructed by various researchers are published in a recent book by Shaw and Wright (1967). A sampling of some of the attitudes which these scales

were designed to measure may be of interest. This listing is not complete, but it does indicate the variety of scales available at this time: scales have been designed to measure attitudes toward: self-reliance; teaching; education; competition; church and religion; dating; divorce; mental patients; farming and various other occupations and professions; homemaking activities; menstruation; birth control; movies, academic freedom; safe driving; mental illness; socialized medicine; censorship; capital punishment; school integration; segregation and desegregation, the acceptance of black students in colleges; vivisection; older people; internationalism; war; mathematics; physical education; law, justice; evolution; death, God; various school subjects, ethnocentric attitudes; attitudes toward police, supervisors, probation officers; teachers, parents, the mentally retarded, fraternities; labor unions and newspapers.

In addition to the scales themselves, Shaw and Wright also provide the scoring values, scoring procedures and other technical information on the construction of each test. Although the constraints in a particular evaluation situation may preclude the use of an existing test, a researcher may still find this book to be a valuable source of items.

In general there are two major approaches that have been used in developing attitude scales. The judgment method involves the use of a judging group in obtaining scale values for the items, and is most closely associated with work done by L. L. Thurstone. The response methods, rather than attempting to assign scale values to items, rely on the direct responses of agreement or disagreement given by a pilot group of *S*s to the entire original pool of items. Likert-type scales, named for the man who initiated the response method of scale construction, are the most widely-known.

The majority of attitude scales have been developed by either the Thurstone or the Likert technique. We shall therefore describe these procedures in some detail both as an illustration of the differences between judgment and response methods, and as an aid in evaluating the results of attitude scales. Several other techniques of scale construction, some of which reflect considerable statistical refinement and theoretical sophistication are described in Edwards (1957) and Fishbein (1967).

The main purpose of the scale construction technique developed by Thurstone is to build an attitude scale with equal-appearing intervals dividing the continuum between opposing extremes in attitude. For instance, one may be measuring attitudes toward campus demonstrations. The most favorable item on the scale may be "SDS leaders are the heroes of today" and the least favorable item, "Leaders of demonstrations should be shot." If the scale has been constructed by the Thurstone method, the remaining items would be chosen so as to divide equally the psychological range between these two extremes. Thus, items

are chosen for the final scale whose scale values are distributed evenly along a continuum of favorableness-of-attitude.

It may be helpful to an investigator choosing a method of attitude scale construction to note that a person's response on a Thurstone scale localizes his position along a continuum. The respondent will agree with only one or two items that reflect his attitude and will disagree with items lying on either side of the scale from these. This method of discriminating between individuals may be differentiated from Likert-type scales on which the respondent indicates the *degree* of his agreement or disagreement with each item, then is assigned a total score computed by summing the subscores assigned to each response.

The procedure in constructing a Thurstone-type scale is as follows:

1. Gather together a large number of items (e.g., 100) that are related to the attitude being investigated. These should reflect opinions all along the dimension being measured, from favorable through neutral to unfavorable.
2. Reproduce the items on separate slips of paper.
3. Choose at least 40 independent judges who are similar to those persons to whom the final scale will be applied.
4. Give a set of items to each judge, in randomized order, with instructions to sort them into eleven equally spaced piles, according to the degree of their favorableness toward the object being measured. Judges are to disregard their personal agreement or disagreement with the items. The most unfavorable statements are placed in pile No. 1, slightly less unfavorable in pile No. 2, and so on to pile No. 6, which should contain items that show a neutral attitude. Pile No. 7 then contains slightly favorable items and so on until pile No. 11 which contains the most unfavorable items in the pool.
5. Eliminate judges as careless or otherwise deficient in performing the task who have placed more than 30 statements in one pile.
6. Compute the scale value of each item by taking the median or mean position to which it was assigned by the judges. Items with a scale value above 6 are those which are judged, on the average, to be favorable and those with a scale value below 6, on the average, are judged as being unfavorable.
7. Eliminate items as ambiguous or irrelevant that were placed in piles too widely scattered by different judges. The variation in the distribution of judgments for each item may be determined statistically by computing the interquartile range, or Q. When the judges agree on the placement of an item, Q will be small, compared to its value when there is relatively little agreement among judges.

8. Select items (usually about 20) for the final scale whose scale values are spread out evenly along the continuum from extreme in attitude to the other. If more than one item has the same or similar scale value, the item with the smaller Q should be chosen.

The final items are printed in (usually) random order without their scale values and respondents are asked to check those statements with which they agree. Presumably those individuals with favorable attitudes will agree with statements that have favorable scale values, and individuals with unfavorable will agree with items that have unfavorable scale values. An individual's score is computed as the mean or median of the scale values of items with which he agrees. It is interpreted as indicating his position on a scale of favorable-unfavorable attitude toward the topic being investigated.

The judging procedure developed by Thurstone resulted from his concern for devising a scaling technique that would divide the psychological continuum between opposing extremes in attitudes into equal-appearing intervals. Likert's main concern, however, was with the unidimensionality of the measure—attempting to assure that all of the items measured the same common factor.

The procedural steps in building a Likert-type scale are as follows:

1. Collect a large pool of items which are either clearly favorable or clearly unfavorable to the concept being measured.
2. Administer these items to a pilot group of about 100 persons who are representative of the population to whom the final scale will be applied. Ask each respondent to indicate the degree of his agreement with the item on a (usually) five-point continuum ranging from "strongly agree" to "agree," "uncertain," "disagree" and "strongly disagree."
3. Assign scores of 1-5 to the response categories for each item such that 1 will reflect a strongly unfavorable attitude and 5 will reflect a strongly favorable attitude. The direction of the scoring weights assigned to the response categories will depend on whether a particular statement is favorable or unfavorable. Thus, if a statement is regarded as being favorable, scoring weights assigned to the five categories would be 5 for a "strongly agree" response, 4 for an "agree" response, 3 for an "uncertain," 2 for a "disagree" response, and 1 for a "strongly disagree."

   If a statement is regarded as being unfavorable, the direction of the scoring weights is reversed (e.g., "strongly agree" receives a score of 1 and so on).
4. Compute the total score of each individual by summing the separate weights assigned to his responses over all items. Individuals with favorable attitudes will presumably tend to give "agree" and

"strongly agree" responses to favorable items and "disagree" and "strongly disagree" responses to unfavorable items. Consequently, they will obtain relatively high total scores. This situation will be reversed for persons with unfavorable attitudes.

5. Identify high and low scorers—i.e., those respondents whose scores fall in the upper and lower quarters of all the scores.
6. Compare the responses of the high and low scorers to each item. Statistical techniques, such as t-tests between the means of high and low scorers on each item, or correlational methods, may be used to identify the most discriminating items. However, a simple procedure may suffice to obtain the same ordering of statements; compute the difference between the means of the high and low scoring groups on each statement and retain those items (usually about 20) for which this difference is greatest.

The final scale is thus derived from those original items which most clearly differentiate between persons holding a favorable attitude and those holding an unfavorable attitude.

On the final scale, responses are again scored from 1-5 on respective categories ranging from "strongly disagree" to "strongly agree" for favorable items and the reverse is true for unfavorable items. An individual's total score is taken as the sum of the weights assigned to his individual item responses. This score reflects the degree of favorableness of his attitude, and ranks him in relation to other persons on the scale.

There is some evidence to show that if the same set of items is used to construct attitude scales by both the judgment and the response methods, scores on the two scales will be highly correlated. Both types of scales tend to have relatively high reliability coefficients and choice of method is more or less arbitrary. Both types of scales provide for a relatively wide range of scores, and consequently, relatively good measures of individual differences.

Another technique that has been used to measure attitudes is the Q-sort, developed by Stephenson (1953). The Q-sort, while most frequently used in personality assessment, may be broadened in application to measure individual feelings or attitudes toward any subject. Its purpose is to obtain a picture of an individual's unique view of what is being considered by asking him to sort a large number of statements relevant to the topic into piles reflective of a range of opinion. The procedure is thus very similar to the judging process in constructing a Thurstone scale.

Q-sorts may be used as a ranking method in which statements that are relevant to the topic under consideration or descriptive of personality characteristics are compared with one another and placed in piles along a continuum. They may also be used as self-descriptive devices,

where the continuum of piles into which statements are sorted ranges from "most like me" to "least like me." More than one Q-sort may be obtained from an individual in order to assess any changes that may have taken place in his attitudes over time, perhaps as a result of some experimental treatment given between measures. For instance, Q-sorts may be used to determine an individual's attitudes toward some topic before and after he is exposed to a persuasive message. Or, one might ask a teacher to make Q-sorts for his pupils several times during a year with respect to their adjustment and reactions to school situations.

The steps to be followed in devising and administering a Q-sort are:

1. Determine the criterion by which sorting is to take place, (e.g., degree to which the item describes the sorter; agreement/disagreement with the item, etc.).
2. Collect items (sentences, phrases or words) relevant to the task. Usually, from 50-100 items are used.
3. Determine the number of categories or intervals into which items will be sorted.
4. Determine the number of items to be placed in each category such that the final distribution approximates a normal curve. For instance, if 60 statements are to be sorted into seven categories, the number of items to be placed in each category would be assigned as follows:

	Strongly Disagree						Strongly Agree
Category	1	2	3	4	5	6	7
Number of Items	3	6	12	18	12	6	3

   Refer to a normal curve table (printed in most statistics texts) if needed.
5. Give cards containing one item each to the subject, with instructions for sorting according to (1) the criterion, (2) the number of piles and (3) the number of cards to be sorted into each pile.

Scores as assigned to the successive categories according to the degree of favorableness or descriptiveness of items to be sorted into each category. For example, if nine categories are used, the one containing strongly unfavorable or least-descriptive statements would be assigned a score of 1 and so on to a score of 9 for the most favorable or most descriptive category. The individual statements then receive the score assigned to the category into which they are sorted.

When more than one Q-sort has been obtained from the same set of items, correlations may be computed to explore the degree of relationship between the sets of responses. For example, correlations may be

used in a pre-post design to investigate the change in an individual's sorting pattern after some experimental treatment, such as a motion picture. Or, comparison between sortings, such as the relation between self-image and ideal image, may be made. Correlations may also be used to compare a given individual's views about various topics, e.g., different school subjects, or to compare the views of different persons about a given topic.

In addition, a defining Q-sort may be obtained by asking a group of judges to sort the statements so as to describe a person holding an extremely favorable attitude. If the judges agree, their individual Q-sorts will be positively correlated, and an average rating can be computed for each statement; these averages can then be used to form a criterion, or defining, Q-sort. Individual Q-sorts may then be correlated with the defining Q-sort; the resultant correlation coefficient is regarded as the individual's score. The higher the positive coefficients, the closer the individual's position corresponds to the judges' view of an extremely favorable position. Negative correlations presumably would indicate an unfavorable attitude.

The final method of assessing attitudes that will be discussed here is one which has gained widespread popularity in recent years, partially because of the minimum of time and effort involved in constructing it. This is the Semantic Differential, originally developed by Osgood, Suci, and Tannenbaum (1957) as an objective method for measuring the connotative meaning of a concept or object to an individual. Subjects rate a given concept or object on a series of seven-point bipolar rating scales, with each pole defined by an adjective, e.g., Beautiful ___ : ___ : Ugly.

In the developmental stages of the technique, Osgood *et al.*, identified three basic dimensions of meaning represented by sub-groups of scales from the responses of many persons toward diverse concepts and objects. Sets of scores were submitted to factor analysis, and the results showed rather consistent clusters of scales around the following three dimensions: (1) Evaluative—whether the individual views the object or concept favorably or unfavorably; (2) Potency—the individual's perception of the power of the object or concept, and (3) Activity. Exemplary groups of bipolar scales which have been shown to reflect these basic dimensions of meaning are, respectively, (1) fair-unfair, clean-dirty, good-bad, valuable-worthless; (2) large-small, strong-weak, heavy-light, (3) active-passive, fast-slow, hot-cold.

It seems that certain scales, such as "hot-cold," which has been shown to group with scales on an activity dimension, reflect a rather subtle feeling-tone toward the object or concept being rated.

Although the Evaluative dimension is the strongest, accounting for the largest percentage of the total variance in individual's responses, the

inclusion of scales representing the Potency and Activity dimensions provide somewhat more information regarding individuals' attitudes. There may be little correspondence between ratings of a concept or object on the different dimensions. For instance, in an early study utilizing the technique, Osgood *et al.* (1957) studied the meanings of several political concepts (e.g., Taft, Truman, Socialism, the Atom Bomb, Stalin, Policy in China) to three groups of people. One of the results was that Stalin was rated very low on the Evaluative dimension, but high on the Potency and Activity dimensions. As another example, we might expect "white rose buds" to be rated as favorable, but unpowerful and inactive. These examples illustrate the necessity of interpreting scores on the Semantic Differential within the framework of the concept(s) or object(s) being rated. Whereas high scores on the Evaluative dimension reflect a favorable attitude, high scores on the Activity and Potency dimensions may carry quite different meanings. In some cases, investigators have chosen to obtain ratings only on the Evaluative dimension, which corresponds to the favorable-unfavorable dimension measured on other types of attitude scales.

In using the scales, a respondent is asked to rate a given concept—e.g., a political institution, a person, an issue, work of art, etc.—on a series of the bipolar scales. The concepts to be rated are chosen so as to fit whatever problem is being investigated. Whereas most concepts to be rated are presented as single nouns, investigators have also used noun phrases, adjectives and a variety of nonverbal stimuli, such as TAT pictures, Rorschach cards, paintings, sculptures and sonar signals (Osgood *et al.*, 1957). The method has found application in the areas of personality research, communications, advertising research, as well as attitude measurement.

The procedure in constructing a Semantic Differential is as follows:

1. Determine the concept(s) to be rated. The number and type chosen will depend on the problem being investigated.
2. Choose appropriate bipolar scales. (At least three scales each from the Evaluative, Potency and Activity dimensions are recommended. Osgood's work typically uses 10 scales, although number and type of scales will vary with the particular question under study.)
   The researcher may be required to define his own scales.
3. Design response sheets:
   a. Use one page per concept to be rated.
   b. List the concept at the top of the page. Concept orders for different respondents may be randomized.
   c. Place bipolar scales below the concept name.
      (1) Ordering of scales on consecutive pages (concepts) remains fixed.

(2) A constant polarity direction for each scale is maintained on consecutive pages.
(3) Scales drawn from a single dimension are alternated in polarity direction (e.g., good-bad, worthless-valuable).
(4) The order of scales representing different dimensions is rotated. Example:

good	___: ___: ___: ___: ___: ___: ___:	bad
mild	___: ___: ___: ___: ___: ___: ___:	intense
active	___: ___: ___: ___: ___: ___: ___:	passive
interesting	___: ___: ___: ___: ___: ___: ___:	uninteresting
worthless	___: ___: ___: ___: ___: ___: ___:	valuable
strong	___: ___: ___: ___: ___: ___: ___:	weak
slow	___: ___: ___: ___: ___: ___: ___:	fast
colorless	___: ___: ___: ___: ___: ___: ___:	colorful
fair	___: ___: ___: ___: ___: ___: ___:	unfair
shallow	___: ___: ___: ___: ___: ___: ___:	deep
restless	___: ___: ___: ___: ___: ___: ___:	quiet

4. Write instructions, to include:
   a. general orientation to the task.
   b. the significance of the scale positions and how to mark them (no omissions, check marks in center).
   c. attitude toward the task (speed, first impressions, independence of judgments).

In analyzing the data quantitatively, the usual procedure followed is to assign values from −3 to +3 or from 1 to 7 or the rating intervals lying between adjective pairs, such as that the interval closest to the adjective representing negative evaluation, low potency, or low activity receives a score of −3 or 1, and the interval lying closest to the opposing adjective receives a score of +3 or 7. The successive integers represent the points in between (e.g., the scale point nearest "cold" receives a score of −3 or 1; the point nearest "hot" receives a score of +3 or 7, with the successive integers representing the points in between.

An individual's score on each scale for each concept may then be assigned in terms of the scale positions that he has checked. The individual's rating of the concept on each of the three principal dimensions (Evaluative, Potency, and Activity) can be assessed by averaging his scores for the respective sub-group of scales belonging to each dimension. Thus, on a scale with scoring weights from −3 to +3, a given student's attitude toward a particular educational film may rate 3 in the Evaluative dimension, .5 in Potency, and 2.1 in Activity.

Responses obtained on the Semantic Differential may be used to compare an individual's attitudes toward different concepts, for exam-

ple, a lecture on history versus a film. Similarly, one may compare two individuals' ratings of a given concept. Ratings given by groups of people can be arranged in order to assess differences in attitudes between groups, or toward various concepts within the group. The same concepts may also be rated at different points in time, to assess any changes in attitudes that take place.

There is some evidence to indicate that attitude scores obtained with the Semantic Differential are positively correlated with scores obtained on other attitude scales.

Educational media represent a potentially significant means for influencing the formation and the modification of attitudes. Although the methods of assessing attitudes that are presented in this paper are not exhaustive, it is hoped that the educational media technologist will gain some insight into the various tools available to him in assessing the effects of his materials and in designing programs for instructional use.

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Affect Through Simulation: The Gamesman Technologist

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The intent of this chapter is to present to the technologist reader:

- An orientation for using learning games and simulations to produce affective responses, and
- A discussion of a moderate number of affect-producing simulation and gaming strategies.

When you have completed the chapter, you should be able to construct nimbly and with a warm pleasant flush of positive affect, solutions to the following kinds of instructional problems:

- A social science teacher in South Dakota wants some help to get her 6th graders interested in the problems of the European Common Market.
- Your mother-in-law, who teaches high school English to a lower socio-economic class complains that she can stimulate no interaction between students and subject matter.
- The President of Death Valley University asks you to develop an instructional package to gain student support, and empathy, for his position. The package must be portable, self-instructional, and adaptable to individual, small or large group instruction.

To assist you in achieving such perceptual orientation and skill, the authors will be routing you along three successive steps:

- An expository review of what simulation and educational gaming is all about;

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- A summary highlighting the kind of affective outcomes that appear most susceptible to simulation and game techniques;
- A series of affect building and repair hints for the apprentice gamesman.

The authors appear to be fascinated by each sentence in the chapter. However, in the event you feel engulfed in more information about simulation and games than you wanted to know, we have provided fail-safe exits at convenient points throughout the chapter. If you feel a need to depart at times, please use these marked exits.†

I. Review of Simulation and Gaming

Simulation and games may be the hottest act in the educational circus judging from increasing attention and interest. In 1969, *Education USA*[1] stated that educational games "may be the beginning stages of an important new movement in education." The journal, *Social Education*[2] receives more manuscripts on simulation than on any other topic. In the last year or two, it is reported that the United States Information Agency (USIA) featured several of the WFF 'N PROOF instructional games in their Tenth Cultural Exchange Program entitled "Education USA in the Soviet Union".[3]

Ancestors of the Innovation

The innovation called "simulation and gaming" may be traced to at least three ancestors: simulators, games, and role-playing. The ancestral list may be longer, but for present purposes, these three will suffice.

Simulation has been defined in the most general terms as the obtaining of the essence of something, but without all aspects of reality (cf., Thomas and Deemer, 1957). *Simulator trainers* illustrate this definition admirably. A pilot trainee may learn to fly an airplane by use of a simulator that even provides the appropriate visual stimulus of a runway that informs him whether he is too low or too high, or off-center. If a real-life plane were used, practice landings would be most hazardous for the novice and distasteful to his copilot and navigator, not to mention the expense of taking the craft off the ground. Yet, the computer-controlled simulator provides the essence of flying without the hazard. The attempt here is to allow the trainee to experience vicariously what he

[1] *Education USA*. Washington, D. C.: National School Public Relations Association, February 17, 1969.

[2] *Social Education*, 1969, Vol. 33, No. 2.

[3] *The WFF 'N PROOF Newsletter*. Turtle Creek, Pa.: WFF 'N PROOF, Fall 1969.

† Fail-Safe exit points are shown in the margins as: and re-entry points as:

eventually has to experience in the real-life world. Some aspects of reality are omitted, while other aspects are represented.

Games may be thought of as competitive encounters between individuals that involve some degree of skill and/or luck. Games have been a part of most cultures for some time, and are usually looked upon as a quite pleasant (or even stimulating) diversion. One cannot deny that leaving a game of chess uncompleted to perform more mundane tasks may be quite jarring (at least for the avid player). Excellent theoretical discussions of games are available elsewhere for the serious student (cf., Luce and Raiffa, 1957).

Role-playing is taken by some to mean the depiction of characters in scenes for illustrative purposes. For example, an instructor may stage a proper interview approach in a course of training for a team of research workers. Others take role-playing to mean the same thing as sociodrama, which in its original meaning, refers to a therapeutic technique that involves groups as compared with psychodrama, which is a therapeutic technique for individuals. Still others equate role-playing with "let's pretend" or "play-acting". Grambs (1958) defines role-playing as "unprepared, unrehearsed, dramatization". In any event, all of the various definitions of role-playing center mainly around the development of deeper understanding of social relations. The practice of experiencing the actions and feelings of someone else is typified in most simulation games. For example, when a learner behaves as though he were a senator in a legislative assembly, clearly, he is "being someone else".

From these three rather different ancestors–the simulator for training, the game for entertainment, and role-playing for understanding one's self and others–has evolved the educational innovations that now are grouped under the heading, "simulation and gaming". No attempt will be made here to justify what innovations belong in the list, and which do not. For the most part, making sense out of the field of simulation and gaming conceptually in an attempt to justify any grouping of techniques under the label seem rather unsatisfying (cf., Tansey and Unwin, 1969, pp. 35-48; Twelker, 1969, pp. 18-45). The tack to be taken here is to arbitrarily single out three types of techniques that are usually considered as representative of the innovation, and relate these to the three ancestral roots identified above. The three techniques are:

Media-Ascendant Stimulation–techniques that emphasize learning through vicarious experience usually mediated by machines, films, pictures, etc.

Interpersonal-Ascendant Simulation–techniques that are characterized by decision-making, role-playing, and player interaction

Non-Simulation Games–techniques that feature a competitive context

for learning concepts and principles drawn from formal disciplines (sometimes referred to as motivational games).

Although these categories are not foolproof, they do serve as a "benchmark" for exploration into the innovation. Perhaps a few examples under each category would be helpful:

Media-Ascendant Simulation
- Classroom Simulation (Teaching Research)
- Teaching Problems Laboratory (SRA)[4]
- Simulator Trainers
- Simulation of Dental Emergencies (Teaching Research)
- "One-man" Computer Games, e.g., Sierra Leone Development Project

Interpersonal-Ascendant Simulation
- Most Social Studies Simulation Games, e.g.,
  - "Manchester" (Abt Associates)
  - "Consumer" (Academic Games Associates)
  - "Tracts" (Instructional Simulations, Incorporated)
  - "Inter-Nation Simulation" (SRA)
- Most Management Games
- Planning Exercises

Non-Simulation Games
- "WFF 'N PROOF"
- "Equations" (Wff 'n Proof)
- "Propaganda" (Wff 'n Proof)
- Get Set Games for Beginning Readers (Houghton Mifflin)

The table below summarizes the ancestral heritage for each category:

Technique

Ancestor	Media-Ascendant Simulation	Interpersonal-Ascendant Simulation	Non-Simulation Game
Simulation	Yes	Yes	No
Gaming	Depends on Technique	Yes	Yes
Role-Playing	Depends on Technique	Yes	No

Instructional Uses of Simulation and Gaming

For Presenting Information. The non-simulation game is an excellent vehicle for presenting information, or more precisely, providing oppor-

[4]At least those portions involving media

tunities for learners to acquire or organize knowledge. For example, the game of "Equations" gives learners the opportunity to use various mathematical operations such as addition, subtraction, multiplication, and division, in a variety of situations, all determined by the chance throw of cubes and any rule variations agreed upon by the players. On the other hand, simulations ranging from models (and even motion pictures), in-basket type exercises, and games may be used to present information, not only for training and instruction, but for indoctrination and demonstration. It should be made clear, however, that the simulation exercise, whether media-ascendant or interpersonal-ascendant, is geared more to problem-solving, information treatment, manipulation and use, and decision-making type outcomes than for information acquisition.

For Exercising Skills. For this use, the simulator trainer has few equals if practice demands a realistic environment. The training of pilots in simulated aircraft has been alluded to above. In civilian education, a unique application of mediated simulation is found in the "Classroom Simulator" developed at Teaching Research (Kersh, 1961; 1963a; 1963b; Twelker, 1967). Their classroom simulation creates for the pre-service teacher during the sequences is employed in sixty different problem sequences mediated on sound, motion-picture film. In each case, the student teacher is expected to react to the film as though he were in a real classroom.

In this simulated classroom, the pre-service teacher faces a 10 foot square screen on which filmed episodes of children appear life-size and just as active. What the children do in the film sequence depends upon the action taken by the trainee. Doing nothing, for example, is followed by very noticeable responses by the youngsters. Pre-service teachers who have been through the program report that if they failed to make a prompt and decisive move, on occasion "all hell broke loose." Classroom simulation is based on the supposition that exposition of educational methods or principles could be expected to help the teacher *talk* about teaching, but classroom experience (simulated or real) could train the beginning teacher to *teach.* It has been suggested that classroom simulation in this form helps students practice the discriminating of cues that signal potential problems that require immediate attention, make decisions in simulated conditions without fear of censure or embarassment, and to modify their behavior on the basis of this feedback (Twelker, 1967).

Another example of the use of simulation for the exercise of skills is the familiar management decision-making simulation. Participants "make believe" or play decision-makers of competing companies in a hypothetical or real industry. To watch the players absorbed in the simulation reveals intense involvement in analyzing tables and charts, projecting profits (and losses), and recommending output rates, sales strategies,

and prices. Properly structured, a simulation game can provide quite realistic opportunities for the practice of executive decision-making.

For Assessing Performance. A third aspect of instruction where simulation is of use is in the assessment and evaluation of performance. The assessment of performance may be carried out using simulation in all sorts of activities, and offers a unique opportunity to assess performance in a life-like setting that is often times untestable by other means. For example, it is difficult to think of a paper-and-pencil test as being adequate to test the performance of astronauts in a space vehicle coupling activity.

In-basket tests
Russell Sage Social Relations Test
Patient Management Simulation (American Board of Orthopedic Surgery)
Motion Picture Tests

Schalock and his colleagues (Schalock, *et al,* 1964; Beaird, 1967) have shown that as test stimuli become more representative of the behavior to be predicted, and as the opportunity for response approaches the freedom characteristic of life situations, the power of prediction increases. Tests were developed to predict teacher-classroom behavior. The simulation test consisted of filmed episodes of typical classroom problems. Student teachers were forced to react to these. Results of this simulation test were compared with typical paper-and-pencil questionnaires. Beaird points out that "the extent to which prediction was possible with the more life-like test is essentially unprecedented in the educational and psychological literature". He goes on to state that at least 50 percent of the variance in the criterion that was being predicted to was accounted for in each of fifteen separate criterion measures that represent a concrete teacher behavior in the classroom, and as much as 75 percent of the variance was accounted for in some instances. The question of simulation for performance evaluation is discussed further by Gagné (1954; 1965), and Frederikson (1957), Thorndike (1947), Gibson (1947), and Schalock (1969).

Clinical Uses of Simulation and Gaming

A further set of relatively unexplored possibilities for simulation and gaming lie in the areas discussed below, see Crawford (1968).

For Diagnosis. Some use has been made of simulations as screening devices in professional education (Levine and McGuire, 1968; McGuire, 1968; University of Illinois, 1967) and as part of a criterion test via the critical incident technique (cf., Frederiksen, 1962). However, their employment to measure aspects of personality has not been pursued.

Simulations offer powerful advantages as contrasted to the conventional testing instruments:

a) Realistic problems can be presented with all the attributes that tend to give them impact. The usual verbal and pictorial instruments are necessarily abstracted with much of the affect-producing elements omitted.

b) The sequences of the subject's interactions and moves, and a series of his perceptions, decisions, actions and subsequent perceptions of his own decisions and their consequences can be made visible. Furthermore, these observations can be sustained for lengthy periods as required or even replicated.

c) The range of possible stimuli to be used can be definitely expanded. For the nonverbal or highly disturbed subject this may be a crucial aspect of diagnosis.

d) The combination of simulation with modern audiovisual recording allows for obtaining direct and replicable responses. The disadvantages usually associated with examiner interpretation and coding can thus be minimized.

For therapy. Many game-like processes have been incorporated into various approaches to therapy. Role-playing and the expressions of feelings have been the primary emphases. However, little effort has been given to the combination of such affect with rational decisions, examining consequences from those decisions, etc.; that is, the pattern used by a typical simulation game in which other aspects than pure feeling are emphasized. The advantages of the development of such graded series of simulations in which the introduction of usually avoided feelings and decisions is gradually made to the client, offers an approach consonant with learning theory and one that may be practicable in terms of therapist time. It is quite feasible that the newer learning games may teach and therapy games may heal without the continuous intervention of skilled professionals.

For Measuring the Effects of Therapy. The treatment outcomes of psychological problems has been most recalcitrant to evaluation. The use of simulations to measure the degree to which people have changed under treatment presents new possibilities for the controlled introduction of those complex and realistic setting factors which have thus far clouded attempts to measure outcomes.

We might, for example, develop a series of pre- and post-tests that would incorporate various problem situations based on initial problems before and after treatment could be carefully analyzed. One advantage is that stressful and motivating conditions are readily and unobtrusively introduced into simulation exercises so the tendency for client responses

to reflect socially desirable outcomes rather than his real way of handling the problem can be minimized.

For Promoting Positive Growth and Health (Not Simply for Curing Mental Illness or Healing Weaknesses). Learning games offer a productive mix of cognitive and affective interactions for increasing human potential. Combinations of strategic problem-solving, artistic creation and the feelings of joy and ecstasy usually associated with the peaks of human achievement may be more readily accessible through a series of planned simulations. Simulations offer a chance to introduce the complexity required in a carefully graded series of learning encounters designed to promote rapid growth and learning, maximizing transfer.

For Healing Intense Social Conflicts. Many social problems are based on intense disagreements about values, attitudes and perceptions of others' roles, but solutions are slow in attainment. The employment of simulation games offers a chance to get key participants involved and cognizant of the outlook and the problems of others in a deeper way than the mere cognitive identification or naming of the other person's views. The use of such games to first broaden understanding and then develop cooperative solutions may be a promising one for labor-management, student-administration, and black-white difficulties.

II. What are the Affective Outcomes?

The evidential support for affective outcomes is composed of low grade ore. Much of it is accrued from direct observation by hardly disinterested game developers and instructors, from oral reports of feelings given by students to staff after a game, and from jerry-built paper-and-pencil questionnaires. Exceptions to this are in the minority, although more respectable observation reports are beginning to be published. The evidence concerning the affect of games is about as sound and as weak as the evidence for the affect produced by any other educational innovation.

However, there are consistent themes reported by observer after observer. Occasionally these are buttressed by:

1. data from attitude scales
2. unobtrusive measures of attendance, time spent in free-choice alternatives, related books and materials sought in libraries.

The individual pieces of evidence are weak. But *streams* of evidence point in the same general direction. The affective outcomes which we will identify have been repeatedly reported across observers, games, classes of learners and repeated trials. Members of our own staff and others from various institutions have observed these. The following af-

fective outcomes represent, in our best judgment, good working hunches as an initial basis.

Affective Outcomes of Simulation Games

Involvement

The affective behavior that has impressed game developers and disinterested observers alike, has been the intense involvement of the participants. Complete absorption in the game activity, obliviousness to other events and time is repeatedly observed across a range of learners and games.

In a classroom learning game most students do not run for the door at the sound of the bell or typically, get ready to leave before it rings. It's often difficult to eject them from the room at the end of the period. We have conducted games for junior high school students after school on their own time, starting at 2:00 p.m. and were forced to close the game down and oust players at 6:00. In the Armed Forces, it was reported that a player fell from a raised platform during a simulation game. The player broke his leg and lay supine for ten minutes before his teamates noticed him.

Our own staff has observed games where gray-haired school administrators, in the presence of their own teachers, grasp each other by the coat lapels and shake vigorously. Peter Winters (quoted in Twelker, Crawford, Wallen, 1967) reported that the Carnegie-Tech Business Game became so absorbing to the graduate students and staff that they began extending its play month after month, until it threatened to engulf the entire curriculum.

This involvement often persists well *after* the playing period. College participants report carrying on the games at nights in the dorm and through the weekend. A high school senior speaks to this point in a filmed interview (Wallen, Crawford and Twelker 1967).

> The thing about the games is that you don't just quit at the end of the period and go to your next class. You keep on playing the game—in the hall and in your other classes. And after school, you'd say to people, 'I'll do this for you, if you'll do this for me.' You just can't stop the game.

Emotion

The typical feeling most apparent during games is the mild elation accompanying absorbed progress toward a goal. However, peaks of ecstasy, rage, and shock are not atypical. Expressions of intense joy are at

first associated with major goal achievements. After continued play, they are evinced at the completion of a strategic move (one which probably leads to a goal).

Positive emotions however, are not always the case. In some games, serious losses of player resources occur. During an inservice training workshop using *Crisis,* a political game, a high school teacher lost not only his position as national leader, but his entire nation. The player went into a state of shock for approximately 20 minutes. He turned pale, refused to leave his seat at the table, addressed no one in particular, but kept repeating "They can't do this, this can't be done, they can't do this." The other players in the game, some thirty odd, finally continued the game around him, bypassing his table.[5]

An outcome that is most noticeable with younger children, particularly disadvantaged children, is their sustained attention during the game. For example, most observations suggest that a few minutes is the limit for preschoolers attention to language exercises (Bereiter 1966) but four year olds will play highly cognitive language games for over thirty minutes with no loss in attentiveness. Experience with urban disadvantaged learners suggests that the prospect of engrossing dropout students in the history of the mercantile system, for a four-hour stretch, may be slight. It has been done with the *Triangle Trade* game.[6]

Perception of Others

Students often report that their perception of others has changed following the game experience. This is most evident when the participant has been placed in the other person's position during the game e.g., a dropout, diplomat, businessman, etc. Usually, the change is in the direction of increased and sympathetic awareness of the pressures on the other person, the constraints he was forced to operate under, and the multitude of factors with which he had to cope. From an extreme example, "I still don't agree with them. But, they don't seem so ridiculous any more. Given their point of view some of the things they say and do make sense."[7]

Students have frequently observed that they didn't realize the pressures decision-makers were under until they played role. This effect achieved by standing in the other man's moccasins is probably not due

[5]For the clinically minded, he appeared to recover. We have met him at later training sessions in which he continually requests another turn at that particular game.

[6]A history game designed by Durham and Crawford (1969).

[7]A professed ultraliberal high school student was involved for several weeks as a far-out rightwinger in a political game.

solely to the free role-playing, dramatic component of the game. Being caught up in the same cognitive, decision-forcing system is another important component, and is evidenced by being forced to operate with the resources of the other, making decisions in light of the information available to him, and following the same constraints.

Attitudes

The attitude change possible through learning games extends well beyond sympathy and understanding toward a particular person. Attitudes toward principles and social issues are influenced by game participation. Examples of objects toward which attitude changes have been measured following participation in learning games include:

1) a broader role for women;
2) the importance of community planning;
3) diplomatic negotiations.

Attitude change is not restricted to accepted standards of social demands. In one game students enact the roles and make decisions required by the early Yankee molasses, rum and slave trading triange. After the game most students appear to develop a pro-slavery attitude. The students justify slavery, using the same arguments that are cited during that historic period. This pro-slavery attitude has been resistant to one-hour discussions and interrogation sessions by our own staff. We are now designing an antidote game–the same scenarios, but from the early African point of view.

The change in attitude is frequently unobtrusive to the learner. The attitude is not specifically identified and he is not *told* that he needs to change his attitude. Often he is not presented much chance to object or quarrel with the proposed change. It is slipped in as a side-affect of his assigned role, but reinforced repeatedly at different levels. Thus change is made somewhat unconsciously and imperceptably, the way enduring attitudes in the learner's own life have been developed.

There is evidence that favorable attitudes tend to develop toward the particular subject content of the game itself, and occasionally to some degree toward the overall academic area e.g., social studies, economics, etc. The fervent prayer of leaders in game development is that extensive use of games will result in more favorable and stable attitudes toward school and learning. The hope is still viable but inconfirmed.

Attitudes toward the instructor may change. In most educational games the instructor's role shifts from center to off stage. He is no longer judge, jury, and the fountain head of information and precepts. The rules of the game and the players occupy the stage. The teacher *can* serve effectively as a consultant or coach.

Self Perception

The crucial feelings for many learners may focus more with themselves than with external objects and events. Do learning games influence one's self-perception and attitudes?

One aspect of self-perception which has captured the attention of game developers has been feelings of self-efficacy. "Control of destiny" is the romantic title frequently applied to such feelings. In most games each player can make a noticeable difference in the outcomes by his own moves. Consequences of his moves are apparent and often dramatic. His decisions *do make* an impact on the game environment and his own future in the game. The nurturance of such feelings first in the game, then to the sphere of activity simulated by the game, and then to a generalized "I am the captain of my fate" outlook has spurred game developers. This goal still beckons.

Expression of Feelings

Participant communications in a learning game can and do become highly loaded with feeling content. Expressions of personal satisfaction, distrust, a need for dominance, a quest for structure, a request for support are frequent and visible during the play. Sometimes the game resembles a group projective technique. Such expressions are often manifest and direct.

The open expression of affect appears to be a side effect, not necessarily unwanted, in most learning games. Neither the game rules or the suggested discussion or debriefing procedures afterwards are usually geared to deepen the exploration of feeling. Further expression and reflection could be done, although instructors ordinarily are not trained in such skills. One possible advantage of the simulation game is that the rules and player roles provide some safety of detachment for the player. A discussion concerning feelings "in the game" is less likely to arouse defenses than a discussion centering on "your feelings".

Interaction Among Students

Educational games are designed to maximize peer interaction as opposed to student-teacher interaction. Almost all the games examined stimulate and reward frequent peer interaction. The effects of several hours of such intense communication between students in the classroom has been noted by a number of observers. One result is that the shy and diffident sometimes open up and become moderately talkative, and more active members of student groups.

Another occasional result is that the classroom atmosphere appears to change. Students appear free to talk among themselves, to question the teacher, to take the initiative in bringing up points and expressing their

views. An effect more frequently observed is that students who have been turned off become turned on for a while. In the game the typical performance hierarchy of the A, the B, the C, and D student is disrupted. Frequently, boys who have been marked as underachievers or indifferent to school, come alive and play dominant classroom roles.

Affective Cognitive Interaction

Affective outcomes we have just discussed were achieved in a context primarily emphasizing problem solving, analysis and interpretation of information, decision making, the examination of the consequences of one's own action and those of others, the exploration of alternative possibilities, and prediction making. In learning games these affective outcomes are developed in interaction with cognitive outcomes. The learning games referred to were not designed as a setting for an orgy of passion. It has been a continual surprise that so much affect has developed in an intended cognitive context.

The technique of these educational games presents a unique opportunity to integrate the cognitive, affective, and psychomotor aspects of learning. Eli Bower has pointed out that if one were to emphasize just the cognitive objectives in education, the result might be an "intellectual giant with no emotions". On the other hand, if one were to emphasize the affective domain, the result might be an "emotional explosion with no rationality."[8] Educators are often prone to separate instructional objectives into neat categories (cf., Bloom, 1956; Krathwohl, *et al.*, 1964), and often neglect to integrate what has been thought of as separate. Further, the emphasis on *passive reception* through lectures, textbooks, and the like, often leaves little room for the activities that integrate the various types of objectives in a way that is meaningful to the student. Games and other simulations offer teachers an opportunity to deal with emotions in handling the problems that demand the application and integration of previously learned principles.

Learning Game Variables that Facilitate Affective Outcomes

Observation of a number of present educational games suggests that the following factors seem related to the production of affect. Games high in these factors appear to produce positive affect:

1. The learners are active in self-directed behavior, making choices, carrying out decisions, etc.
2. Feedback of consequences is frequent, visible, and often dramatic.
3. Interaction among students is maximized, and interaction between student and teacher is reduced and changed in quality.

[8]Personal communication

4. Both competitive and cooperative behaviors are heavily reinforced.
5. Perceptual support, i.e., graphic art of resources, gains, losses, etc., is given.
6. A tinge of uncertainty flavors the expected consequence of each move.
7. The format emphasizes reward for accomplishment; punishment or aversive feedback is de-emphasized.
8. The play and fantasy quality of the game enables the player to be immersed, yet feel comfortable.
9. The concepts, symbols, and principles used by the player are largely selected and transposed at his discretion and into his own style –they become part of his personal domain.

The Reverse Side of the Coin: Negative Affect

Although the consensus of evidence points to those affective outcomes previously described as typical of most student players–in most of the nationally disseminated games–a persistent minority report continues:

1. Not infrequently competition becomes intense–players manifest the symptoms of extreme anxiety.
2. Bitter hostility to opposing players and teams.
3. If the game emphasizes winning even through destruction of others and covert cheating, players play the game to *win*. They act like graduate students and university faculty.
4. Consistent losers dislike the game–sometimes–particularly if they have no hope of future wins, and perceive alternatives to the game as more rewarding.
5. Students who need a high degree of structure and order, find the typical learning game confusing and even offensive.

As any reader knows, there are educational innovations called *"books"* that are not worth reading. To identify an object as a *"book"* tells nothing of its effects upon readers. An "instructional game" may exhibit all the variance and more, including variance in the direction of stupidity, pallid obscurity, ennui, or gross sensationalism, observed by readers of *"books"*. However, the recent history of learning game design and development demonstrates that learning games can be designed to:

1. Attenuate competition.
2. Emphasize cooperation or integration of diversity as appropriate strategy.
3. Provide handicaps, a hierarchy of leagues, or a different role–to eliminate the plight of the "born loser".
4. Present a variety of games dealing with the same content–some

structured, some unstructured; some highly cognitive, some predominately expressive; others requiring a fusion of both.

Every man to his own taste and a game for every man.

Affective Outcomes of Media-Ascendent Simulations

Let us now briefly examine what media-ascendent simulation has to offer for individuals interested in the affective domain. The discussion will generally follow the same measures of affect discussed above. The reader should note the differences between interpersonal-ascendent simulation and media-ascendent simulation in terms of their potential for affective learning.

Involvement

Without question, individuals confronted with a media-ascendent simulations are shown to have an amazing capacity to "throw themselves into the situations." Even though the simulation is clearly seen as not reality, still the learner behaves as though it were real life. (At least, that is what is hoped by the designer.) This phenomenon is remarkably illustrated in one particular sequence shown on the popular television show "Candid Camera."[9]

This episode involved an individual delivering a key to a particular doctor's office. The individual was requested by the nurse to sit in the waiting room and wait until the gentleman to whom the key belonged appeared. The television set in the waiting room was then turned on and the messenger observed what he thought was the middle of a "soap opera", which in fact was a staged plot involving the key which he was attempting to deliver. The doctor was irate because he had not been brought the key in time, and was complaining to another nurse about the situation. Although the stimulus was presented by means of television, the messenger began interacting with the drama as though it were real.

It has been observed repeatedly in classroom simulation training (Kersh, 1963; 1965; Twelker 1966) that some individuals become so involved in the simulation that they break down and weep, or become extremely frustrated, and even on occasion, simply refuse to respond. It has been noted by more than one observer of such situations that the classroom simulation training which includes discussions between the learner and an instructor, may involve more therapy than instruction.

The authors have observed pilots in complex computer-controlled weapons simulators where involvement was so tense that the individuals

[9]Fail-Safe Exit for Non-Television Viewers

perspired freely. In these situations, it is clear that the stress is an important factor in creating the environment that produces this involvement.[10] In fact, the learners' perception of simulation as relevant and realistic or irrelevant and unrealistic. It goes without saying that a characteristic of simulators such as flight trainers is the amount of stress that is placed on the student to perform, sometimes in difficult circumstances under limited period of time. In these cases, stress is probably most increased by learner overloading that is, by presenting the learner with too much information that demands him to make an excessive number of responses or decisions in a given period of time. The rate at which a learner may receive information is dependent upon input difficulty, learner ability, and rate at which the input is presented. For example, in classroom simulation training, stress may be increased simply by increasing the number of cues to which a learner must respond. Whether or not the instructor wishes to do this is dependent upon his objectives. If the instructor's objective is to exercise the student in making quick decisions under adverse conditions, such techniques of learner overloading to produce stress may be used. It should be noted, however, that research has not revealed the optimal level of information of overloading for various cognitive or affective outcomes. It might be that excessive student involvement may actually lead to a decrement in cognitive outcome.

The authors do not want to leave the impression that *all* media-ascendent simulations produce such involvement as described above. Even creating the proper amount of stress does not guarantee satisfactory involvement. Smode (1963, p. 118) describes a situation where an aircraft simulator resembled quite closely the operational aircraft in function. However, students perceived it as being unrealistic; they claimed it was too unstable and hence more difficult to fly than the real aircraft. Tests showed this to be false, and pointed up the problem as one of motivation and involvement. Students did not give their undivided attention to "flying" the simulator as they would have in a real aircraft. A momentary lapse of attention caused the student to "get behind" the craft and cause it to go into instability. Such lapses occured in the simulation experience because involvement was low. These lapses would not occur in the operational aircraft because involvement would be total (we hope).

Incidently, involvement may not only affect students. In many cases, it affects the instructor even more. By this we mean that the instructor or the simulation designer in many cases becomes so involved in de-

[10]Fail-Safe Exit. If a discussion of stress seems stressful, re-enter in three paragraphs.

signing the simulation to be realistic that he goes to extremes. By increasing the realism, many think that the simulation becomes more effective. An extreme example of this type of designer involvement may be found in the University of Missouri's Nepali House, where Peace Corps volunteers have duplicated the average peasant abode even to the extent of "bringing in cow dung each week and replastering the floor with it". (cf., Loubert 1967). The relation between fidelity or realism of simulation and motivation will be discussed in greater detail below.

Emotion

Closely related to involvement as discussed above is the factor of the emotion. We are more concerned with those behaviors such as the expression of joy, frustration, and unhappiness that may relate to or follow involvement. Cited above is the example of students in classroom simulation training who become involved to the point of frustration, and break down and cry. In fact, it is often noted in these cases that students experiencing this frustration will move right out of involvement with the simulated problem circumstance. Possibly it is too threatening to their perceived self-concept. The removal of one's self from the simulated (and potentially threatening) situation has been aptly illustrated by Kersh (1962) in his early work in simulation. In the same simulation facility later used for classroom simulation, he attempted to determine if children would transfer learning from the natural setting to the simulated setting. That is, would a child react to a projected image of another person as he would in the real life situation? To test this, films were made of him asking a few questions and giving a few simple commands, such as "What is your name?" and "Write your name." Feedback sequences contained the experimenter repeating the questions and comments more emphatically or praising the learner for his efforts. Fifth grade students were brought into the facility without revealing what was to be projected. When the films were shown, students were found to state their names, write their names, and do other things that were subsequently asked in the simulation films. It was found that the children's reactions to the films were almost identical with their behavior in real life. Kersh also found that if the sound level of the child's voice was low, and the feedback films asking for a louder answer were presented, the children responded with increased sound levels. However, the interesting thing that was observed with one child, (and which halted further work with children) was that when the child was confronted with these filmed stimuli, he became so disturbed that he "withdrew" and assumed a fetal position in the corner of the laboratory. Kersh has reported to these authors that it took quite a long time to work with the child and bring him back into the real life situation. In fact, Kersh

was so impressed with the power of media-ascendent simulation in this situation that it eventually led to the development of the classroom simulation films for teacher education.

The reader is probably well aware of the emotions elicited by motion pictures. Many can hardly resist crying, or minimally swallowing a tear or two when confronted with cruelty and inhumane treatment given to the canine heroes of "Lassie Come Home" or "Dog of Flanders".[11] Few can resist laughing and in some cases even receiving a belly ache over some of the antics shown in comedy films. Is there any less chance that media-ascendent simulation can at least equal the intensity of these emotions, if not surpass them?

Attitudes toward self, others and country. A good example of the use of media-ascendent simulation for changing attitudes toward self as well as other objects and people is in the area of cross-cultural (area) training. Foster and O'Nan (1967) point out that an American's awareness and understanding of the foreign culture with which he is working helps improve communication and his overall effectiveness. This is only part of the story, however, since the American should understand the values and assumptions of his own culture since they inevitably influence his thinking, attitudes, perceptions, and behavior toward the other country. They suggest that insight to, and understanding of, the motives, values, thought patterns, and assumptions of self as an individual American are required.

> Once he 'knows himself,' he is in a better position to identify and understand important aspects of another culture and to increase his ability to modify his own approach. It is only when the American becomes aware of his behavior as a function of the values and assumptions which have become a part of him as a member of the American society, that he is able to be somewhat independent of the 'blinder' composed by cultural determinant and consequently more adaptable and effective in his behavior overseas.

Often, the training approach in bringing about this behavior consists of the presentation of information about culture, that is, American culture, history, and so forth. Often, it would seem that content is peripheral to the goals of understanding one's self. Another approach assumes that more favorable attitudes and appreciation comes through increased knowledge, especially from a historical perspective. This approach seems limited in helping the American to be more effective in communicating and interacting with foreign nationals. A third approach discussed by

[11]Fail-Safe Exit ... those who *can* resist, re-enter at will.

Foster and O'Nan involves the preparing of the trainee to be better able to discuss the United States with foreign nationals and answer various questions about it. This approach emphasizes the importance of being well versed in world affairs and American policy.

Since cultural characteristics are found to be deeply rooted as a determinant of behavior, simulation has been chosen as one of the most promising methods of this type of training which involves among other things the perception of, or empathy toward others. Stewart (1965; 1966) and Danielian (1967) report several simulation exercises utilizing the "Contrast American" approach that could be adapted for use with media. Presently, the simulation, which requires a behavioral event, assumes the form of role-playing scenes. One American advisor and his counterpart meet in a cross-cultural encounter. The scenes are constructed so that culturally derived behavior is evoked from the subject playing the role of advisor. It is conceivable that in time, the role of the counterpart could be filmed and a computer-controlled system be designed to train large numbers of personnel at one time, rather than the one-to-one approach now used.

Another direction of innovation is the PACKAGE program approach developed by Grace and Hofland (1967). PACKAGE involves the use of a variety of media to present information about an area or culture. Maps, picture cards, filmstrips, audio tape, video tape, and motion picture films are used. It should be noted that simulation is not a part of this approach, however, at least as defined by the authors above. However, it would probably be easy to modify the system to capitalize on the strengths of simulation where appropriate.

One other example of the use of media-ascendent simulation for developing attitudes towards others might be mentioned. An important aspect of the training of teachers and administrators in special education is the sensitization of these individuals to the problems of exceptional children. The authors suggest that media-ascendent simulation, as well as other role-playing techniques, be used to develop an awareness of the exceptional child's problems, handicaps, and everyday life patterns, whatever the case may be. Through such training the teacher could develop sensitivities to deal with the child.

Attitudes Toward Instruction

The review of the literature shows that little has been done to measure individual's attitudes toward instruction (the subject, school, learning) in a systematic way. Anecdotal evidence suggests that simulation is regarded as beneficial (Kersh, 1965; Cruickshank and Broadbent, 1968).

In some measure, the effectiveness of the simulation to change attitudes towards instruction is related to the feeling or the attitude of the

learner in the simulation experience, as compared with the feeling experienced in real life. Smode et al., (1963, p. 99) introduces the term, "motivational similarity", to express this concern. It is pointed out that a primary factor in motivational similarity is the realism of the simulation. It is conceivable that a simulation might be designed that would produce optimal transfer except for the fact that its lack of realism causes the learner to disregard the instructional experience because of its obvious falsity. If the student possesses attitudes that are negative toward instruction, then measures must be taken to assure proper conditions for instruction to be effective.[12]

One word of caution must be given when considering the physical similarity of a simulation, and this is relevant in designing a learning game as well as a complex simulator. The design of simulations is often times influenced by a desire to make them "more appealing" and "interesting" to learners and this usually takes the form of increased realism of non-essential elements. If properly done, it adds to the effectiveness of a simulation. It motivates the student, and he regards the experience as meaningful and relevant. On the other hand, simulation designers often resort to "gimmicks" or what Lumsdaine refers to "fancying up" the device or technique which may cause distractions that may "interfere with the attention of the student to the essential task to be learned, and thus have an adverse effect on learning rather than a beneficial one" (Lumsdaine, 1960, p. 283).

Smode points out that motivational similarity is a function of the entire instructional program. The way in which the simulation experience is scheduled, the way in which the experience is utilized, the quality of the instructor, the "set" given to the students by the instructor, the "debriefing", and the development of the syllabus all effect motivation.

Parker and Downs (1961, p. 34) present other evidence that points to the importance of pre-simulation activities in the context of a flight simulator. They cite an unpublished study by Solarz et al. (1953) where one group of students were told how the differences in fidelity between the simulator and the operational aircraft made the trainer practically worthless. Another group of students were told that these differences existed but were of negligible importance in the value of the experience. Thus, the "set" given to the two groups of students differed, and in fact, an attitude scale showed that the groups' acceptance of the simulator was indeed quite different. In actual performance on the aircraft, however, the negative attitude group required more trials to criterion and hence more training time. While lack of simulator acceptance

[12]Fail-Safe Exit

lengthened training time, it has little effect on parallel transfer from the instructional situation to real life.

Now it is difficult to speculate on the implications of the study to the conduct of simulations. Muckler (1959) points out that the pilots were highly motivated to perform at a very high level of competency and this motivation may have overridden any decrements from the negative attitudes toward the simulator. It would be interesting to repeat the study with different classes of students–some of which were highly motivated in the general sense to succeed, and some of which were potential dropouts. In this case, the factor of set may be shown to be quite important for transfer performance as well as instructional performance. In any event, the evidence presented by Solarz is but an indication of the importance of attending to pre- and post-simulation details. The authors suggest that a manual for a contextual response simulation should include the specification of these activities as precisely as those that are commonly thought of as the simulation experience itself.

III. How Can Affective Outcomes be Produced?

Adapting or Modifying an Existing Game

The strategy here would be to find some educational game that tends to produce the desired affect. Identify the components responsible, emphasize or add to those components, and perhaps minimize or remove other irrelevant or interfering components. To effectively modify existing games and simulations in directions of increased outcomes probably requires some of the same knowledge of the design and development of games as does building one from scratch. The following suggestions are given with that assumption. As a check list for increasing affect in an existing game, or adapting it to suit, we suggest the following:

Components of a Simulation Game
That Should be Scrutinized for Potential
Affect-related Outcomes

1. Goals: Are the stated goals or objectives primarily cognitive in nature? Can you adapt or supplement these goals so that feelings, attitudes, etc. weigh more? What about the implied goals of the exercise ("games develop confidence" or "games change students' attitudes")–does the game design reflect these goals or are they merely glib generalizations? Do the game problems and goals tap enough motivation?
2. Reality: Does the game include many elements that are isomorphic to real-life processes, or few? Does it emphasize structures and

constraints that will elicit affect? Does a lack of similarity between the simulation and real-life detract from desired affective outcomes? How can factors be changed so that these outcomes can be achieved?

3. Specificity: Does the game treat a process or structure in an abstract manner (with an hypothetical context) or in a way that is easily transferable to real-life contexts (e.g., a simulation of *any* firm *is* a simulation of a particular firm)? Does one or the other offer more in the way of desired affective outcomes?
4. Duration: Is the simulation lengthy or brief? How long does it take learners to "get into the simulation"? What allowances are made for possible dulling effects of a long simulation, especially one which is physically tiring or mentally fatiguing? How can short simulations be changed to generate affective outcomes quickly and dependably?
5. Role-playing: Is role-playing fixed (limited behavior range and freedom) or open (spontaneous behavior that is little structured or constrained)? What effect does the form and type of role-playing have on affect ("fixed" role-playing may be a powerful teaching tool *per se* but at the expense of affect).
6. Resources allocated to players: Information, power, and material resources can facilitate or attenuate desired affective outcomes. Are these identified and their relationship to affect at least inferred? Does the original resource allocation include feelings, e.g., good-will, reduced anxiety, satisfactions, etc.?
7. Alternative moves allowed and constraints: What alternatives are open to each player? What constraints are imposed? Do these change as the game progresses? Can these be modified to enhance affect? among players: What sort of interaction is allowed? What are the predicted affective outcomes? Can the interactions be increased, channeled, or modified to increase affect?
9. Feedback and rewards: Is the feedback and reward system in the game geared to affect? Are expressions of positive feelings reinforced? Are agreed understandings of each other's position rewarded? Is the reward system primarily based on real-life payoffs (e.g., improvement in making business decisions) or intra-game payoffs (e.g., improvement in status, prestige, or wealth within the game context not related to real life).
10. Time schedule: Is there sufficient time allowed for the development and expression of feelings?

Many educational games give scant attention to such dimensions. They

rely primarily upon the scenario and the role interaction to provide affective propulsion. Most of these games can be substantially altered in the direction of increased affect as a result of such an analysis.

In addition to the scrutinizing of game components discussed above, the gamesman may keep in mind a few principles that seem to hold in most situations where affective outcomes are desired:

Maxims for the Novice Gamesman

1. Provide for active and self-directed behavior by participants;
2. Provide frequent, visible and dramatic feedback;
3. Maintain maximal interaction among participants;
4. Reinforce competition and cooperation;
5. Present perceptual support of resources, transactions, etc. by means of graphic arts, photographs;
6. Attach some uncertainty to each consequence;
7. Emphasize reward, de-emphasize punishment;
8. Reinforce the play and fantasy aspect of the game;
9. Allow the player to transpose the conceptual content to fit his own repertoire;
10. Pitfalls and potpourri from the memoirs of the wounded gamesman:
    a. Be tuned in to thinking of simulations and learning games not as an isolated game-playing session, but rather as a system made up of:
        1. a briefing component
        2. the simulation or game component
        3. a debriefing or post-exercise evaluation
        4. a follow-up activities' component, all within the framework of an ongoing instructional unit
    b. There is more to instruction than simulation and games. The authors have soberly tried to present these approaches objectively, but they realize that they, and possibly a reader, may be carried away with the strategy. Use simulation when it seems appropriate, and don't try to force-fit simulation, games, media, or love.
    c. Be sensitive to, but firm with those who hesitate or refuse to evaluate simulations. Simulations and games need to be carefully evaluated as an innovation lest their demise be premature.

Finally, it would be well to examine a set of suggestions for those areas in which media could profitably be introduced both in participant games and in machine-ascendant simulations:

Areas Open to the
Employment of Media for
Stimulation of Affect

1. Sensitizing learners to the overall problem, or the model to be simulated;
2. Orienting learners to their roles, particularly those emphasizing conditions that may cause affect;
3. Orienting learners to a model of affective behavior to be developed (a suggestion closely related to 2);
4. Presenting critical incidents or problems which are loaded with affect;
5. Presenting problem solving or coping strategies to critical incidents;
6. Recording the participants' own affective responses during the simulation and allowing them to examine these and use them as a basis for further learning;
7. Representing dramatically players of a) starting positions, b) moves, c) outcomes or various stages in a simulation game;
8. Showing examples with degrees of inept affective interaction, which the players could remedy;
9. Assisting a learner to disentangle the cognitive and affective threads in interpersonal communications;
10. Monitoring or assessing learners' attitudes toward situations through simulation. Often, pictures can set the stage for responding in an affective manner in a way that surpasses words alone. Simulation testing (sometimes referred to as situational response testing) elicits more true-to-life behavior than can less realistic forms of tests.

Developing an Original Game

This will require that either the technologist acquire skills as a designer or that he call in a specialist. Training in such skills is frequently given in workshops and institutes. A list of centers of gaming activity is presented in Appendix B. Many of these centers offer training, or information on where training can be obtained. A brief account of the approach used at Teaching Research to develop simulations and games is given below.[13] We doubt if most instructional technologists could begin designing educational games from such reading, as only the high points of simulation and game design are presented, devoid of specific details.[14] [15]

[13]This at least is what our staff reports is the developmental procedure. No goodness-of-fit test has ever been applied to our report versus our actual development behavior.

[14]The Teaching Research approach is discussed in detail by Crawford and Twelker (1969).

[15]Fail-Safe Exit. Mental cravens may re-enter the last paragraph of the chapter.

Figure 1 presents a summary of the sequential steps that may be used in the design and development of a simulation or gaming system.

In designing an instructional simulation system, or any instructional system for that matter, it is useful to think of a gap—a difference between the learner where he is before instruction, and where he is after instruction. Before instruction, we assume that he lacks some knowledges or skills necessary to perform satisfactorily in an operational situation. After instruction, we assume that he possesses these skills. Our problem is to specify the learning conditions necessary to bridge this gap between the learner's initial repertoire and final criterion repertoire.

How best are these instructional conditions specified? Are there instructional methods effective in all kinds of learning activities? To be certain, there are some general rules-of-thumb that seem to hold in a variety of conditions, such as the provision for proper feedback, active participation, spaced practice, and so forth. Yet, it is clear that these guides do not lead us far enough down the road of instructional specification to be of much help at this stage in our technology. Too many decisions must be made in the course of specifying instructional conditions that cannot be answered by examining past research, theory or intuition. Decisions must be made in the best manner possible, and this requirement has in large part prompted the approach to be discussed in detail below. This approach may be summarized as:

(1) Determining what shall be taught
(2) Determining how it might best be taught
(3) Validating the system

System Analysis

Step 1. Define instructional problems

When the designer defines the instructional problem, he answers questions such as: What are the essential characteristics of the problem? Is this information reliable and sufficient to act upon? What is the source of further information? What are some ways I can use to solve the problem?

Before one can improve instruction, he must step back and examine in broad terms what preceeded his decision to develop a new instructional system, what procedures might be used, and what the consequences might be if his intentions were realized. What condition has motivated his tampering with the *status quo,* and why does he believe that intervention can improve the conditions?

Step 2. Describe the operational educational system

Why analyze the operational system? Hamreus (1968) states that "We can no longer afford to engage in the process of modifying components of the educational system as if they were interchangeable; in changing

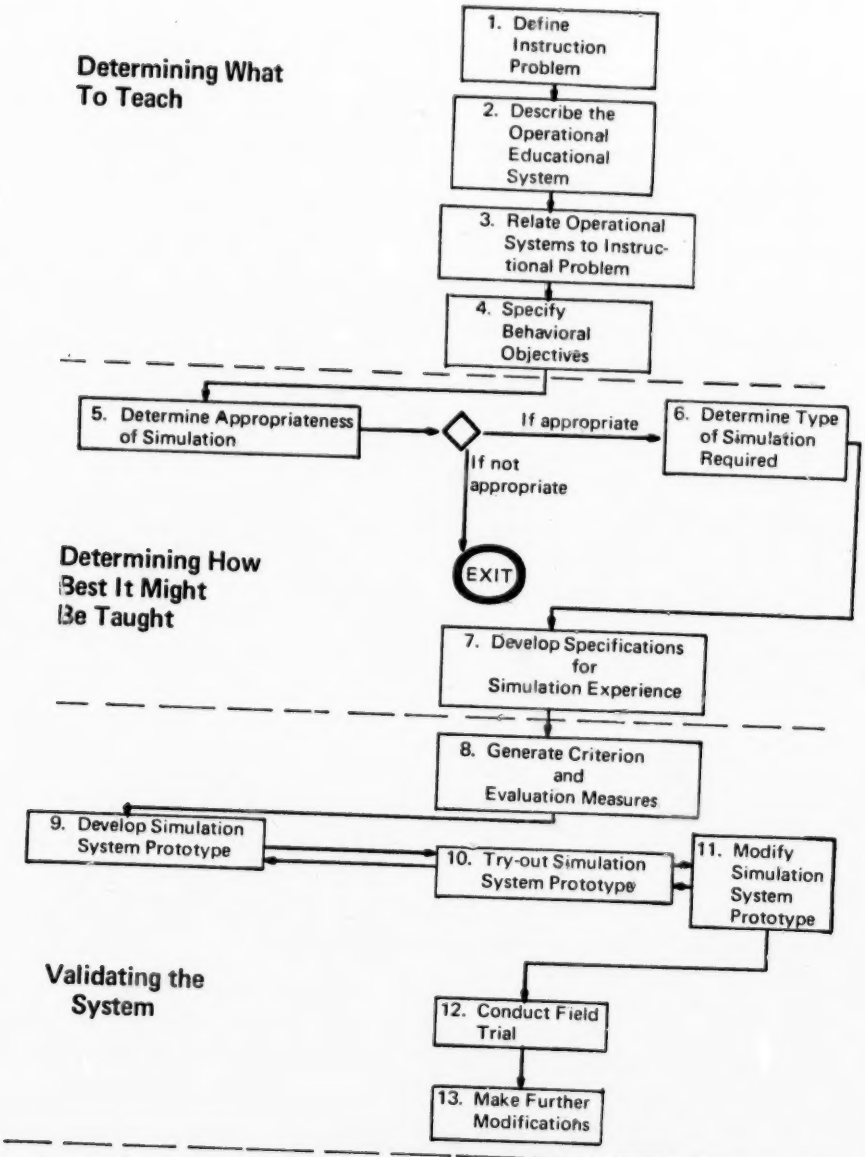
Determining What To Teach
1. Define Instruction Problem
2. Describe the Operational Educational System
3. Relate Operational Systems to Instructional Problem
4. Specify Behavioral Objectives
5. Determine Appropriateness of Simulation
If appropriate
6. Determine Type of Simulation Required
If not appropriate
EXIT
Determining How Best It Might Be Taught
7. Develop Specifications for Simulation Experience
8. Generate Criterion and Evaluation Measures
9. Develop Simulation System Prototype
10. Try-out Simulation System Prototype
11. Modify Simulation System Prototype
Validating the System
12. Conduct Field Trial
13. Make Further Modifications

Figure 1. Steps in the Design of an Instructional Simulation System

any of the entities of the system we change the system structure." What serves as suitable instructional experiences for a set of objectives taught in a given environment may not be effective for the same objectives taught in a different environment that has different constraints placed on it. For example, an excellent self-instructional system may not be at all appropriate for teaching two or more simultaneously. The constraints of the system in which the designer expects to operate must be described.

One more point. What is thought to be a problem may not be the *actual* or *total* problem when the system is examined. Most likely, the analysis will uncover other conditions which must be related to the problem.

In analyzing the operational system, the designer must define such factors as the target group (the learners for whom the system is being designed), manpower capabilities, support equipment, personnel scheduling, available curriculum materials, and description of course limits and developmental time. Also, the designer should examine such things as administrative limits, facilities, money available for developing the new system, educational orientation, and the environment of the learner in which instruction will occur.

In summary, the designer should examine every element that will help him define the problem more clearly and to propose appropriate solutions. In many cases, the analysis of the system may require help from subject matter specialists and "natives" who have a thorough grasp of the educational system, its merits and deficiencies.

Step 3. Relate the operational system to the problem

The inputs identified above must be related to each other and to the problems identified in Step 1. It makes little sense to think of an educational problem in isolation to the context in which it is found. The relating of the initially defined problem with the system may prompt a redefinition of the problem. In some cases the designer will face the chance of delimiting his interests and choosing certain aspects of the problems he has identified. This is based on the assumption that the more one knows about the system, the more clearly the problem will be perceived.

System Design

Step 4. Specify objectives in behavioral terms

Stating objectives of learning in terms of what the learner should be able to do after instruction facilitates the development of criterion measures as well as the specification of instructional experiences. An

adequately stated objective will lead directly to the specification of test item or items. But often times, the use to which objectives are put stops at the specification of test items. The statement of behavioral objectives is but the starting point in the design of instructional experiences. By a process sometimes referred to as hierarchical analysis, enabling objectives which state the specific knowledge/skills that the learner must have in order to arrive at the terminal performance may be stated (cf., Twelker, 1969). The prerequisite behaviors may then be analyzed in terms of the type of learning function represented. This in turn provides a basis for specifying specific experiences required to bring about the type of learning identified. This analysis gives the designer an ample store of information to use when he determines the appropriateness of simulation and gaming as part of the instructional experiences.

Step 5. Determine appropriateness of simulation or gaming

Simulations and games are often more costly in both preparation and performance than more conventional forms of instruction. To justify this additional cost, simulation must offer marked advantages. We have listed below seven possibilities in which simulation may offer a useful and cost-justifying alternative:

1. An emphasis upon emotional or attitudinal outcome.
2. The combination of affective and cognitive behavior—planned integration of feeling and thought can be affected by simulation over a range limited only by concerns of practicability.
3. Motivation to initiate a sustained learner activity—a universal observation of simulations is the high interest and involvement engendered, which alone may justify the development of simulation within an instructional program.
4. Emphasis upon the learner interacting with a complex and reactive environment—so he can discover the effects of alternative decisions.
5. Emphasis upon incorporation of the behavior within the personal domain of the learner—here the learner makes the concept, principle or value learned "part of himself."
6. The application of behavior, particularly under a variety of contexts—simulations and games may be designed so that additional variables can be carefully introduced into the exercise so that the learner can continue to function appropriately in a more and more complex environment.
7. Emphasis upon a "perceptual frame" to sensitize and direct the learner—putting the learner into a desired "set" to shape the pattern of his selections of input and output.

To balance the foregoing somewhat ebullient points, let us briefly describe the debit side of the ledger. For which objectives is *simulation* of questionable use? The answer is straightforward: the acquisition of cognitive knowledge as measured by typical tests. Many of our customary instructional objectives relate to the acquisition of knowledge. Acquisition of verbal symbols so that the learner can recognize them, enumerate them, and regurgitate or recall them, all constitute a large share of present instructional intent. Generally, simulation offers a marked advantage here. On the other hand, non-simulation games are admirably suited for information acquisition and practice. Learning names, concepts, and principles so that they can be recalled verbally or recognized among alternatives is accomplished very nicely with non-simulation games.

Exceptions to this generality should be noted and stem from the simulation indicants enumerated above. Conditions that indicate the fruitful use of simulation for acquisition of symbolic knowledge include:

1. Learners are not interested.
2. Learners are not adept at typical skills required for acquisition, such as reading (although some simulations require extensive study of role information, resources, etc.).
3. Objectives place emphasis upon contextual exercise, uses and applications of symbols.

Other considerations may mitigate against the choice of simulation. These include:

1. High costs–both in terms of development and in terms of the time it takes to use.
2. Problems of intrusion into current instruction–learning games often introduce considerable changes in noise level, physical movement, and teacher role and preparation that are objectionable or at least highly suspect to some instructors and administrators.
3. Difficulty in evaluating learning outcomes–in part, because the marked advantages of simulation lie in those human processes difficult to measure, demonstrable advantages (or losses) may not be reportable.

Step 6. Determine type of simulation or game required

If a decision has been reached to consider the use of simulation or gaming, the next set of decisions relate to the kind, or the attributes, of the simulation to be designed. The three major possibilities mentioned in our opening remarks are: 1) interpersonal-ascendant simulation, 2) media ascendant simulation, and 3) non-simulation games. Table 1 presents a summary of the advantages of each.

Factor	Interpersonal Ascendant Simulation	Media Ascendant Simulation	Non-simulation Game
1. Reproducibility of specific instructional experiences desired	Within limits	Excellent	Within limits
2. Planned variation desired	Within limits	Excellent	Within limits
3. Psychomotor or perceptual learning involved	Not appropriate	Excellent	Possible
4. Learners possess entry and pre-requisite skills necessary	Limited—often pre-game briefing required	Excellent	Excellent
5. Traditional teacher control over class required	Not so good	Very good	Fair
6. Simple and inexpensive technique required	Systems often complex but can be simplified	Not easily done	Generally good
7. Interaction between learners and emphasis on group interaction		Possible but usually costly	Good, but usually in small groups only
8. Learning of interpersonal and social processes	Excellent	Possible	Inappropriate
9. Heterogeneous group involved	Often easy to accomodate	Sometimes costly and difficult	Easy to accomodate
10. Feedback must come from peers, not the "establishment"	Easily done	Difficult	Possible
11. Simple or quick development process required	Not so good	Not so good	Good
12. Insertion into curriculum must be easy	Sometimes difficult	Within limits	Good
13. Large number of learners	Good	Good	Limited—may use several small groups
14. Small number of learners	Within limits	Generally	Generally accomodated
15. Learning objectives emphasize comprehension and recall	Within limits; probably not efficient	Good	Good

TABLE 1. Advantages and Limitations of Each Technique

Step 7. Develop specifications for the instructional system

The actual procedures are too lengthy to be detailed here. A number of sources are available for those interested in the details of designing simulations and games (cf., Crawford and Twelker, 1969).

In this step, the designer should rely on the most relevant principles of instruction, the best judgment he can bring to bear on the problem, and the tactics that are suggested by the analysis of the learning objectives mentioned in Step 4., as he builds the simulation or gaming system. It should be stressed that the design of a simulation game is still an art or craft, and many decisions that a designer has to make cannot be based on empirical evidence, much less a unified theory.

System Validation

Step 8. Generate criterion and evaluation instruments

Two types of instruments are generated in this step. First, the designer should develop the measures for assessing whether or not the stated outcome behaviors were acquired by the learner as a result of the instructional experience. At the same time, he may wish to also develop the measures for assessing enabling (prerequisite) behaviors necessary for adequate performance on the terminal objective. The second type of instrument that should be developed are evaluative measures that assist the designer in making decisions on the subsequent revisions of the system. These instruments are designed specifically to shed light on weak points in the game, to elicit helpful information from the players, and in some cases, to assess learners attitudes toward crucial features of the game.

Step 9. Develop the simulation or game system prototype

At this point, a good share of the work of design has been accomplished, and the "fun" part of building the system begins. If the designer has "done his homework", development should proceed at a fast rate. The main task is that of translating instructional "blueprints" into prototype. The more complete and thought-out the "blueprints", the faster and easier the development. Although the blueprints should be adhered to as closely as possible, the designer should feel free to vary certain specifications if the production effort clearly calls for this. It should be recognized that the designer will have a certain number of production decisions to make that are not specified in his specifications from Step 8. Yet, these should represent relatively minor decisions. By the time the designer arrives at Step 8, he should have a very clear idea of the nature of the system and possible problem areas where production techniques are certain.

Step 10. Tryout the system prototype

An empirical tryout of the system is mandatory. The tryout is limited in nature. If possible, small groups of learners, or even one learner at a time where appropriate, are taken through the systems *by the designer(s).* Close monitoring of the learners is undertaken. Analysis of the system includes empirical data on whether the desired outcomes, both terminal and enabling, were observed, but not limited to this. Learners may be requested to verbalize problems with the materials, and suggest alternate strategies. It should be noted that the limited tryout of a system such as a simulation game may "look" quite different than a tryout of a media-ascendant simulation. A learning game that involves whole classes is quite difficult to monitor without constant "stopping down" of the game. *The video-taping of such tryouts is an extremely effective way to capture activity for later analysis with a select group of learners sitting with the designers.* Members of different teams could help identify where lags in timing occurred, vital relationships between players or teams did not properly develop, and so forth.

It should be emphasized that the tryout is limited in scope—its objective is to gain valuable information for the revision of the system or system components. This is why enabling performance measures are analyzed, as they help the designer detect weak points in the system that result in less-than-adequate terminal performance. In some cases it may be conducted successively. Sometimes, the simulation may be tried out on colleagues before using learners that represent the target group so that responsible criterion may be obtained. In any case, tryout leads to the next step, modification of the system.

Step 11. Modify the system prototype

The three major decisions are made during this step:

1. If the system seems appropriate for obtaining the stated objectives, how can it be improved?
2. If the system does not seem to be appropriate for obtaining the stated objectives, how can it be changed?
3. If the system does not seem appropriate for obtaining the stated objectives, should it be discarded in favor of other types of systems?

The designer must ascertain if the type of instructional experiences chosen is appropriate, and if so, what can be done to improve them. In some cases, the designer may even decide to discard simulation or gaming as an inappropriate technique, either due to cost, faulty design work in Steps 7 and 8, or other factors. Needless to say, the designer may recycle through the steps of production, tryout, and modification

until he has achieved satisfactory results with the system, or has determined its inappropriateness as discussed above. When the system is developed to a point that all components are in a form suitable for use by others *independently*, then the system is ready for a field-trial by selected target-instructors.

Step 12. Conduct field trial

The field trial serves to aid the designer in determining if his newly developed system is capable of "standing by itself", that is, being used in the field under operational conditions by members of the target population. Designers often neglect this crucial step, reasoning that "since I was successful in using the system, everyone else can use it now". Unfortunately, it is the rare system that is capable of being used in such a manner. The safest thing a designer could do is to subject his system to a trial under field conditions. When this is done, the designer may wish to collect data concerning:

1. Stated outcomes–effectiveness of the system in achieving the stated objectives;
2. Unstated outcomes, such as, attitudes of learners and instructors toward the system; retention or transfer measures; other measures of motivation; and
3. The manner in which the system was implemented–conditions, accurate descriptions of learners, setting, etc.

In some cases, the designer might consider securing the services of a third-party evaluation team to conduct the field trial. The obvious advantage is that the evaluators test the system and analyze the data in a totally unbiased manner. The simulation designer, by this point, has a large stake in the success of his system, and unintentionally may allow bias to cloud his conduct, analysis, and interpretation of field-trial data. If such a procedure is followed, the designer should guard against rationalizing or defending negative findings of the evaluation. Rather, he should modify the system to alleviate these negative points.

Step 13. Make further modifications to the system deemed appropriate from field trial evidence

When this point is reached, it is hoped that few "bugs" are found in the system as detected during the field trial. If the previous steps have been executed in an excellent manner, the field trial will indicate improvements, not major changes. In some instances, system components such as instructor's manuals and "packaging" may receive the majority of attention. At this time, the designer may also begin investigating ways to disseminate his system.

A Final Word

Sarane Boocock and E. O. Schild state in their book on simulation games that: "Game design is not only not a science, it is hardly a craft, but rather an 'art' in the sense that we have no explicit rules to transmit." (Boocock and Schild, 1968, p. 266)

Others have made essentially the same statement of media-ascendant simulation. With this position, these writers do not argue. Further, the guidelines offered above certainly are not the final word. But, the use of systems approach to building simulation exercises is one step in the right direction. Meaningful research directions may be identified in the context of the development.

At this point those readers may have attained those objectives originally intended by the authors, i.e., he is able to:

1. Identify the major categories and uses of simulation and gaming;
2. Describe the affective outcomes often produced by simulations and games;
3. List the major steps in either adaption or development of simulation and games.

However, these are pallid cognitive objectives. A reader could attain these without experiencing any of the fire and involvement of simulations and games. To gain such experiences and to attain the skills needed to implement an action, rather than verbally describe games and simulations, we suggest that the reader play--as a participant--several current games and simulations.[16]

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APPENDIX A

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Attention Span	ABT Associates, Inc. *Game Learning and Disadvantaged Groups*, Cambridge, Mass., 1965. (Mimeographed).
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Attitude	Boocock, S.S., Schild, E.O. and Stoll, C. *Simulation Games and Control Beliefs.* Baltimore, Maryland: Johns Hopkins University, 1967.
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	Baldwin, J. "The Economics of Peace and War: A Simulation" *Sociol Inq.* 1965, 35.
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APPENDIX B

List of Centers of Simulation Game Design

Abt Associates, Inc.
55 Wheeler Street
Cambridge, Massachusetts 02138

Academic Games Associates
430 East 33rd Street
Baltimore, Maryland 21218

Academic Games Project
Center for Study of Social Organization of Schools
3505 North Charles Street
Baltimore, Maryland 21218

Behavioral Sciences Laboratory
College of Social and Behavioral Sciences
The Ohio State University
404-B West 17th Avenue
Columbus, Ohio 43210

Behavioral Simulation and Gaming Group
Political Science Department
Peoples Avenue Complex, Bldg. D
Rensselaer Polytechnic Institute
Troy, New York 12181
Attn: Marshall H. Whithed

College of Education
University of Oklahoma
Norman, Oklahoma 73069

Department of Sociology and Anthropology
University of Southern California
University Park
Los Angeles, California 90007

The Didactic Game Company
Educational Services Division of R.B. Enterprises, Inc.
Box 500
Westbury, New York 11590

Educational Simulation Laboratory
College of Education
Ohio State University
Columbus, Ohio

Environmetrics, Inc.
1100 17th Street, N.W.
Washington, D.C. 20046

Games Group, Mental Health Research Institute
University of Michigan
Ann Arbor, Michigan 48104
Attn: Layman E. Allen

Information Resources, Inc.
96 Mount Auburn Street
Cambridge, Mass. 02138

Instructional Simulations, Inc.
2147 University Avenue
St. Paul, Minnesota 55104

Interact
P. O. Box 262
Lakeside, California 92040

Kansas Educational Simulation Center
Division of Social Sciences
Kansas State Teachers College
Emporia, Kansas 66801

Learning Games Associates (WFF 'N PROOF)
2253 Medford Road
Ann Arbor, Michigan 48104

Macalester College Simulation Center
138 Cambridge Avenue
St. Paul, Minnesota 55101

National Academic Games Project
Nova University
S.W. College Avenue
Fort Lauderdale, Florida 33314

or

24064 Avenida Crescenta Valencia
Valencia, California 91355

Political Institutions Simulation (POLIS) Laboratory
University of California
Political Science Department
Santa Barbara, California 93106

Project Simile–Western Behavioral Sciences Institute
1150 Silverado
La Jolla, California 92037

Real World Learning, Inc.
134 Sunnydale Avenue
San Carlos, California 94070

Simile II
P. O. Box 1023
1150 Silverado Road
La Jolla, California 92037

Simulation Systems Program
Teaching Research
Oregon State System of Higher Education
Monmouth, Oregon 97361

Simulated International Processes
Project of the International Relations
Program
1834 Sheridan Road
Northwestern University
Evanston, Illinoi 60201

Sociology Department
University of Michigan
Ann Arbor, Michigan 48104

APPENDIX C

Horn, Robert E. and Zuckerman, David W. (Eds.) *The Directory of Educational Games and Simulations.* Cambridge, Mass.: Information Resources, Inc.: (In press, targeted publication date, Spring, 1970)

An extensively annotated listing of over 1000 simulations and games.

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Over 100 listings of simulations, games and didactic units.

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A basic resource for the novice gamesman.

Twelker, Paul A., (Ed.) *Instructional Simulation Systems, An Annotated Bibliography,* Corvallis: Continuing Education Publications, 1969.

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